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Bonnie Jean Adams
Regulatory Coordinator
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June 26, 2015

VIA RESS, EMAIL and COURIER

Kirsten Walli
Board Secretary
Ontario Energy Board
2300 Yonge Street
Suite 2700
Toronto, ON M4P 1E4

Dear Ms. Walli

Re: Enbridge Gas Distribution Inc. (the "Company" or "Enbridge")
Ontario Energy Board (the "Board") File: EB-2015-0049
Multi-Year Demand Side Management Plan (2015 to 2020)
Corrected Evidence

Enclosed please find the following exhibits:

- Exhibit A, Tab 1, Schedule 1 - Exhibit List (updated)
- Exhibit A, Tab 2, Schedule 5 - New
- Exhibit B, Tab 1, Schedule 6 - Corrected
- Exhibit B, Tab 2, Schedule 3, pages 3 to 8 - Corrected

Please see on the following page a brief table outlining the schedules affected and a synopsis of the corrections that have be made.

Schedule	Original	Revision
Exhibit A, Tab 1, Schedule 1	**Exhibit List**	Exhibit List has been updated to include the new Exhibit A, Tab, 2, Schedule 5 and the interrogatory submission
Exhibit A, Tab 2, Schedule 5	**Additional Curricula Vitae of Company Witnesses**	
Exhibit B, Tab 1, Schedule 6	**Demand Side Management Participant Incentive Deferral Account ("DSMPIDA"):** Through the IRR process, Enbridge discovered that its description of the DSMPIDA in its pre-filed evidence could be enhanced for clarity.	Enbridge has responded to interrogatories according to the intended purpose and functioning of the DSMPIDA.
Exhibit B, Tab 2, Schedule 3	**Avoided Natural Gas Costs:** During the IRR process Enbridge discovered that the avoided natural gas costs used to calculate TRC Plus and PAC were incorrect, with the result of inflating avoided costs and all dependent values.	Enbridge has corrected its avoided natural gas costs. Due to the integrated nature of this input, the number of revisions resulting from this change in Exhibit B, Tab 2, Schedule 3 are too numerous to practically recount. In the context of the TRC Plus test as a screen of cost-effectiveness, the impact of this change is not material as none of Enbridge's DSM offers have reduced in cost-effectiveness below a TRC Plus ratio of 1.
	Adaptive Thermostats: Subsequent to conducting its TRC Plus and PAC analysis for the initial filing of EB-2015-0049 the Company received more appropriate incremental costs for adaptive thermostats.	Enbridge has now incorporated the best available information into its calculation of the cost-effectiveness of adaptive thermostats. While the cost-effectiveness of this offer has reduced both in the TRC Plus and PAC tests, it remains cost-effective.

The submission has been filed through the Board's Regulatory Electronic Submission System ("RESS") and will be available on the Company's website under the "Other Regulatory Proceedings" tab at www.enbridgegas.com/ratecase.

If you require further information, please contact the undersigned.

Yours truly,

(Original Signed)

Bonnie Jean Adams
Regulatory Coordinator

cc: Mr. Dennis O'Leary, Aird &Berlis
EB-2015-0049 Intervenors

EXHIBIT LIST AND DESCRIPTIONS

A- ADMINISTRATIVE

Exhibit	Tab	Schedule	Title	Description	Witness(es)
A	1	1	Exhibit List and Descriptions		
	2	1	Application		
		2	Curricula Vitae of Company Witnesses		
		3	Curricula Vitae of Consultant Witnesses		
		4	Glossary of Terms		
		5	Additional Curricula Vitae of Company Witnesses		

B- EVIDENCE

Exhibit	Tab	Schedule	Title	Description	Witness(es)
B	1	1	Background and Context	Provides the historical context for the development of the 2015-2020 Plan	M. Lister F. Oliver-Glasford B. Ott
		2	DSM Plan Overview and Guiding Principles / Board Priorities	Outlines the Plan's overall strategy and approach. Describes how the Plan addresses the various requirements, guiding principles and priorities of the new DSM Framework	F. Oliver-Glasford M. Lister

B- EVIDENCE

Exhibit	Tab	Schedule	Title	Description	Witness(es)
B	1	3	2015 DSM Transition Year Plan	Describes Enbridge's approach to the 2015 Transition Year, as well as budgets, metrics and targets	M. Lister F. Oliver-Glasford B. Ott
		4	Program Budgets, Metrics and Targets	Describes the budget, metrics and targets developed for each DSM Program	M. Lister F. Oliver-Glasford B. Ott
		5	Sensitivity Analysis	Outlines natural gas savings levels under a number of budget scenarios	M. Lister K. Mark F. Oliver-Glasford B. Ott
		6	Deferral Accounts and Variance Accounts	Proposes new accounts for tracking, recording and using certain funds	F. Oliver-Glasford M. Lister R. Sigurdson S. Bertuzzi S. Moffat
	2	1	2016 - 2020 Offer Descriptions	Provides a detailed description of each offer proposed in the DSM Plan	D. Naden E. Lontoc F. Oliver-Glasford J. Paris M. Lister P. Goldman R. Kennedy S. Bertuzzi S. Hicks

B- EVIDENCE

Exhibit	Tab	Schedule	Title	Description	Witness(es)
B	2	2	Evaluation Plan	Outlines the Evaluation Plan for the Multi-Year DSM Plan	D. Bullock F. Oliver-Glasford R. Idenouye R. Sigurdson
		3	TRC and PAC Analysis	Presents the cost-effectiveness analysis for 2016-2020	R. Idenouye S. Moffat F. Oliver-Glasford B. Ott R. Sigurdson
		4	System Characteristics and Rate Allocation	Provides information on characteristics of the Company's distribution system and information on the rate impacts of the Plan	R. Idenouye S. Moffat F. Oliver-Glasford B. Ott R. Sigurdson
		5	Avoided Costs	Describes the Company's approach to the development of avoided costs	S. Mills S. Moffat F. Oliver-Glasford R. Sigurdson
		6	Input Assumptions	Presents the input assumptions which support the savings calculations used in developing the Plan	F. Oliver-Glasford R. Sigurdson T. Whitehead A. Zaidi
	3	1	Prospective Stakeholdering	Describes the Company's position regarding future relations with stakeholders	M. Lister F. Oliver-Glasford R. Sigurdson

B- EVIDENCE

Exhibit	Tab	Schedule	Title	Description	Witness(es)
B	3	2	Retrospective Stakeholdering	Describes the stakeholder consultation process which informed the Multi-Year DSM Plan application	S. Bertuzzi D. Naden P. Goldman F. Oliver-Glasford R. Kennedy B. Ott M. Lister J. Paris E. Lontoc E. Reimer S. Mills R. Sigurdson
		3	Integrated Resource Planning	Provides background and anticipated next steps regarding Integrated Resources Planning	S. Mills F. Oliver-Glasford H. Thompson
		4	DSM Potential Study	Provides a background intervenor consultation detail and anticipated next steps regarding the DSM Potential Study	F. Oliver-Glasford J. DeVenz M. Lister R. Sigurdson S. Mills
		5	Carbon Pricing	Describes an opportunity should a price be placed on carbon emissions in Ontario	F. Oliver-Glasford B. Ott
	4	1	CDM Collaboration	Describes the Company’s ongoing engagement with Local Distribution Companies	M. Lister F. Oliver-Glasford E. Reimer R. Sigurdson

B- EVIDENCE

Exhibit	Tab	Schedule	Title	Description	Witness(es)
B	4	2	Collaboration and Innovation Fund	Proposes rationale and next steps for a new funding vehicle aimed at pilots	M. Lister F. Oliver-Glasford
		3	On-Bill Financing	Outlines background, key issues and next steps related to on-bill financing	M. Lister E. Lontoc F. Oliver-Glasford J. Paris
		4	Green Button	Describes the primary components of the Green Button Initiative	M. Lister F. Oliver-Glasford J. Paris
		5	DSM Information Technology System and Tools	Describes current challenges and anticipated requirements of the DSM Information Technology system	S. McGill F. Oliver-Glasford B. Ott

C – SUPPORTING DOCUMENTATION

Exhibit	Tab	Schedule	Title	Description	Witness(es)
C	1	1	Potential Study	Provides an assessment of the technical, economic and achievable potential for gas energy savings from energy efficiency in the Company's franchise area	Navigant Consulting, Inc.
		2	Potential Study – Response to Stakeholder Comments	Provides the Consultant's response to questions and commentary by intervenors relating to the DSM Potential Study	Navigant Consulting, Inc.
		3	IRP Study – Scope of Work	Outlines a study the Company shall undertake regarding IRP	S. Mills F. Oliver-Glasford H. Thompson

C – SUPPORTING DOCUMENTATION

Exhibit	Tab	Schedule	Title	Description	Witness(es)
C	1	4	Avoided Distribution Cost Study	Provides downstream avoided costs suitable for the Company to include in their current avoided gas costs	Navigant Consulting, Inc.

I – INTERROGATORIES AND RESPONSES

Exhibit	Contents	Witnesses
TOPIC 1 - GUIDING PRINCIPLES AND OEB PRIORITIES		
I.T1.EGDI.STAFF.1	Board Staff Interrogatory	EGDI
I.T1EGDI.CCC.1	CCC Interrogatory	EGDI
TOPIC 2 – DSM TARGETS		
I.T2.EGDI.STAFF.2 to 8	Board Staff Interrogatories	EGDI
I.T2.EGDI.BOMA.3, 7, 9 ,15, 16, 18, 19, 58, 62 and 64	BOMA Interrogatories	EGDI
I.T2.EGDI.CCC.11, 13 to 15 and 22	CCC Interrogatories	EGDI
I.T2.EGDI.CME.1, 5, 10	CME Interrogatories	EGDI
I.T2.EGDI.EP.4, 10, 17, 19 to 21, 26, 34 and 38	Energy Probe Interrogatories	EGDI
I.T2.EGDI.FRPO.1 to 3	FRPO Interrogatories	EGDI
I.T2.EGDI.GEC.7, 10, 13 to 16, 19, 31 and 39 to 41	GEC Interrogatories	EGDI
I.T2.EGDI.SEC.5	SEC Interrogatories	EGDI
I.T2.EGDI.VECC.2 and 11	VECC Interrogatories	EGDI

I – INTERROGATORIES AND RESPONSES

Exhibit	Contents	Witnesses
TOPIC 3 – DSM BUDGETS		
I.T3.EGDI.STAFF.9 to 13	Board Staff Interrogatories	EGDI
I.T3.EGDI.BOMA.1 to 2, 5, 11, 20 and 53	BOMA Interrogatories	EGDI
I.T3.EGDI.CCC.2, 4 to 6, 8 to 10, 16, 20, 21, 24, 25, 28 and 33	CCC Interrogatories	EGDI
I.T3.EGDI.CME.2, 3, 8, 9, 11 and 12	CME Interrogatories	EGDI
I.T3.EGDI.ED.1 to 17	Environmental Defence	EGDI
I.T3.EGDI.EP.2, 3, 5 to 9, 11, 13 to 15, 18, and 31	Energy Probe	EGDI
I.T3.EGDI.GEC.9, 11, 12, 28 and 38	GEC Interrogatories	EGDI
I.T3.EGDI.SEC.2, 6, 8 and 10	SEC Interrogatories	EGDI
I.T3.EGDI.VECC.3 to 5, 7 to 10	VECC Interrogatories	EGDI
TOPIC 5 – PROGRAM TYPES		
I.T5.EGDI.STAFF.14 to 22	Board Staff Interrogatories	EGDI
I.T5.EGDI.BOMA.17, 22 to 25, 28 to 32, 36 to 39, 41 to 48, 52, 57, 59, 61, 65, 67 and 68	BOMA Interrogatories	EGDI
I.T5.EGDI.CCC.3, 12, 17, 18, 23, 27, 29, 31, 32, and 34.	CCC Interrogatories	EGDI
I.T5.EGDI.CME.6 and 7	CME Interrogatories	EGDI
I.T5.EGDI.ED.18 and 19	Environmental Defence	EGDI

<u>I – INTERROGATORIES AND RESPONSES</u>

Exhibit	Contents	Witnesses
<u>TOPIC 3 – DSM BUDGETS</u>		
I.T5.EGDI.EP.22 to 24	Energy Probe	EGDI
<u>TOPIC 5 – PROGRAM TYPES</u>		
I.T5.EGDI.GEC.3, 5, 17, 20 to 25, 32 and 37	GEC Interrogatories	EGDI
I.T5.EGDI.LIEN.2 to 4	LIEN Interrogatories	EGDI
I.T5.EGDI.SEC.3, 7, 12, 14 to 24	SEC Interrogatories	EGDI
I.T5.EGDI.VECC.12 to 21 and 23	VECC Interrogatories	EGDI
<u>TOPIC 6 – PROGRAM EVALUATION</u>		EGDI
I.T6.EGDI.STAFF.23 to 25	Board Staff Interrogatories	EGDI
I.T6.EGDI.BOMA.26, 27 and 55	BOMA Interrogatories	EGDI
I.T6.EGDI.EP.29	Energy Probe	EGDI
I.T6.EGDI.GEC.6 and 26	GEC Interrogatories	EGDI
I.T6.EGDI.SEC.4, 25 and 26	SEC Interrogatories	EGDI
<u>TOPIC 7 – INPUT ASSUMPTIONS</u>		EGDI
I.T7.EGDI.STAFF.26	Board Staff Interrogatories	EGDI
I.T7.EGDI.BOMA.63	BOMA Interrogatories	EGDI
I.T7.EGDI.EP.25	Energy Probe Interrogatories	EGDI
I.T7.EGDI.GEC.18	GEC Interrogatories	EGDI
I.T7.EGDI.SEC.1	SEC Interrogatories	EGDI

I.T7.EGDI.VECC.24	VECC Interrogatories	EGDI

I – INTERROGATORIES AND RESPONSES

Exhibit	Contents	Witnesses
TOPIC 8 – COST-EFFECTIVENESS SCREENING		
I.T8.EGDI.BOMA.13 and 14	BOMA Interrogatories	EGDI
I.T8.EGDI.CCC.26 and 30	CCC Interrogatories	EGDI
I.T8.EGDI.EP.16 and 30	Energy Probe Interrogatories	EGDI
I.T8.EGDI.GEC.8, 27, 34 and 35	GEC Interrogatories	EGDI
I.T8.EGDI.VECC.22	VECC Interrogatories	EGDI
TOPIC 9 – AVOIDED COSTS		
I.T9.EGDI.STAFF.27	Board Staff Interrogatories	EGDI
I.T9.EGDI.FRPO.4 and 5	FRPO Interrogatories	EGDI
I.T9.EGDI.GEC.29, 30, 33 and 42 to 60	GEC Interrogatories	EGDI
TOPIC 10 - ACCOUNTING TREATMENT: RECOVERY AND DISPOSITION OF DSM AMOUNTS		
I.T10.EGDI.STAFF.28 and 29	Board Staff Interrogatories	EGDI
I.T10.EGDI.EP.12, 27 and 28	Energy Probe Interrogatories	EGDI
I.T10.EGDI.SEC.11 and 13	SEC Interrogatories	EGDI

<u>I – INTERROGATORIES AND RESPONSES</u>

Exhibit	Contents	Witnesses
TOPIC 13 – OTHER		
I.T13.EGDI.GEC.1, 2 and 36	GEC Interrogatories	EGDI
I.T13.EGDI.LIEN.1	LIEN Interrogatories	EGDI
I.T13.EGDI.OSEA.1 to 3	OSEA Interrogatories	EGDI
I.T13.EGDI.SEC.9	SEC Interrogatories	EGDI
I.T13.EGDI.VECC.1, 6, 25, 26, 29 and 30	VECC Interrogatories	EGDI

ONTARIO ENERGY BOARD

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. pursuant to Section 36(1) of the *Ontario Energy Board Act, 1998,* S.O. 1998, for an order or orders approving its Demand Side Management Plan for 2015-2020

APPLICATION

1. Enbridge Gas Distribution Inc. ("Enbridge" or the "Company") is an Ontario corporation with its head office in the City of Toronto, and carries on the business of selling, distributing, transmitting and storing natural gas within Ontario. The Company also undertakes Demand Side Management ("DSM") activities.

2. The Ontario Energy Board ("OEB" or the "Board"), on December 22, 2014, issued its *Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015 -2020)* and the *Filing Guidelines* (EB-2014-0134) (hereinafter jointly referred to as the Framework). The Framework requires Enbridge to file a multi-year DSM plan that provides the details of Enbridge's DSM activities for the years 2015 through 2020. This Application seeks approval from the Board for Enbridge's 2015 to 2020 Multi-Year DSM Plan.

3. Enbridge hereby applies to the Board, pursuant to the provisions of the *Ontario Energy Board Act, 1998,* as amended, and the Board's *Rules of Practice and*

Procedure for such final, interim or other orders and directions as may be appropriate in relation to this Application and the proper conduct of the proceeding.

4. The persons affected by this Application are the customers of Enbridge. It is impractical to set out the names and addresses of the customers because they are too numerous.

5. Enbridge requests that a copy of all documents filed with the Board by each party to this proceeding be served on the Applicant and the Applicant's counsel, as follows:

<u>The Applicant</u>

Mr. Andrew Mandyam
Enbridge Gas Distribution
Inc.
Director, Regulatory Affairs

Address:	500 Consumers Road North York, ON M2J 1P8
Mailing Address:	P.O. Box 650 Scarborough, ON M1K 5E3
Telephone:	(416) 495-5499
Email:	EGDRegulatoryProceedings@enbridge.com

Applicant's Counsel

Mr. Dennis M. O'Leary
Aird & Berlis LLP
Barristers and Solicitors

Address:	Brookfield Place, Box 754 Suite 1800, 181 Bay Street Toronto, ON M4J 2T9
Telephone:	(416) 865-4711
Facsimile:	(416) 863-1515
Email:	doleary@airdberlis.com

6. Please quote the name or docket number of the proceeding in all communications.

DATED: April 1, 2015 at Toronto, Ontario.

ENBRIDGE GAS DISTRIBUTION INC.

(Original Signed)

Andrew Mandyam
Director, Regulatory Affairs

CURRICULUM VITAE OF
SHANNON BERTUZZI

Experience: Enbridge Gas Distribution Inc.

Manager, Residential Energy Solutions
March 2015 – present

Manager, Residential Sales
September 2012 – March 2015

Portfolio Manager, Residential Customer Growth
September 2008 – August 2012

Marketing Manager
September 2007 – September 2008

Direct Energy

Manager, Marketing Communications

January 2005 – September 2007

TELUS Mobility

Brand Manager, Marketing Communications

February 2004 – January 2005

Wunderman

Account Director
February 2000 – February 2004

Account Supervisor
January 1999 – February 2000

Senior Account Executive
February 1999 – February 2000

Blitz Direct and Promotion

Account Executive
June 1998 – February 1999

TBWA Chiat / Day

Account Executive
March 1997 – June 1998

Cundari Group Ltd.

Account Coordinator / Jr. Account Executive
February 1996 – February 1997

Education:	St. Clair College, Windsor, Ontario Advertising Completed an Advertising Business Diploma Program 1993 –1995
	University of Windsor, Windsor, Ontario Completed two years of Bachelor of Arts and Science Program 1990 – 1993
Memberships:	Canadian Marketing Association, BILD, BILD Board of Director, OHBA, CHBA (Net Zero Council), EnerQuality Partner council,
Appearances:	(Ontario Energy Board) None to date

CURRICULUM VITAE OF DEBORAH BULLOCK

Experience:

Enbridge Gas Distribution Inc.

Team Lead, DSM Audit
2015

Senior Analyst, DSM Evaluation, Monitoring & Verification
2013

MGI Financial Inc.

Vice President, Retail Distribution
2011

Director, Retail Distribution
2009

Branch Manager
2007

Streetviews, Inc.

Vice President, Product Development & Strategy

Gordon Private Client Corp.

Vice President, Retail Administration

Wallace Dewan & Partners

Vice President, Corporate Initiatives

Midland Walwyn Capital

Director, Sales Support and Marketing

Education:

University of Western Ontario
Bachelor of Arts – Economics and Statistical Sciences

Memberships:

Association of Energy Service Professionals
Director, Ontario Chapter

Appearances:

(Ontario Energy Board)
None to date

CURRICULUM VITAE OF
JOHN DEVENZ

Experience:	Enbridge Gas Distribution Inc.
	Project Lead, DSM Relationships and Projects 2013
	Manager, DSM Commercial Marketing 2012
	Manager, DSM/CDM Business Partnerships 2006
	Manager, Energy Technology 2001
	Program Manager, New Product Development Program 1996
	Project Manager, Industrial Gas Utilization, 1991
Education:	B. E. Sc. Mechanical Engineering, Western University Certificate in Strategic Leadership, University of Toronto
Professional Associations:	Professional Engineers of Ontario Project Management Institute

CURRICULUM VITAE OF PETER GOLDMAN

Experience:	Enbridge Gas Distribution Inc.
	Manager, Industrial Sales 1998
	Gas Utilization Consultant 1993 – 1998
	Eclipse Combustion Inc.
	Sells Engineer 1983 – 1986
	Engineering Manager 1986 – 1993
Education:	Mechanical Technology Ryerson Polytechnic Institute 1979 – 1982
Memberships:	The Association of Energy Engineers Certified Energy Manager (CEM)
Appearances:	(Ontario Energy Board) None to date

CURRICULUM VITAE OF
SCOTT HICKS

Experience: Enbridge Gas Distribution Inc.

Program Advisor - New Construction Residential / Commercial
2012

Enbridge Gas New Brunswick

Program Manager - Residential New Construction and Existing
2010

New Brunswick Community College

Manager of Marketing, Communications & Recruitment
2008

Siteposition

Marketing / Business Development Manager
2006

Cavendish Farms

Assistant Brand Manager
2004

Education: Dalhousie University
Masters of Business Administration

Atlantic Baptist University
Bachelor of Arts

Memberships: None

Appearances: (Ontario Energy Board) - None

CURRICULUM VITAE OF
RODNEY IDENOUYE

Experience:	Enbridge Gas Distribution Inc. DSM Specialist, DSM EM&V 2012 Senior Analyst, DSM Research & Evaluation 2002 Analyst, DSM Research & Evaluation 2000 EDS Canada Business Representative 1994
Education:	University of Waterloo Bachelor of Environmental Studies
Memberships:	None
Appearances:	None

CURRICULUM VITAE OF
ROB KENNEDY

Experience:	Enbridge Gas Distribution Inc.
	Commercial Marketing Lead 2013
	Commercial Sales Lead 2011
	Commercial Energy Solution Consultant 2009
	Enbridge Electric Connect Inc.
	Consultant
	Canon Canada
	Key Account Manager
	Direct Energy
	Business Development Manager
Education:	Algonquin College Business Administration
Memberships:	None
Appearances:	(Ontario Energy Board) None

CURRICULUM VITAE OF
MICHAEL LISTER

Experience:	<u>Enbridge Gas Distribution Inc.</u>
	Sr. Manager, Energy Solutions, 2014
	Sr. Manager, Regulatory Policy & Strategy, 2010
	Manager, Investment Planning, 2006
	Manager, Volumetric & Market Analysis, 2004
	Supervisor, Volumetric & Market Analysis, 2003
	Sr. Market Analyst, Volumetric & Market Analysis 2002 - 2003
	<u>NRI Industries Inc.</u>
	Production Scheduler, Logistics, 1999-2000
	<u>Fairlee Fruit Juices Ltd.</u>
	Raw Materials Coordinator, 1998
	<u>Coats Canada Inc.</u>
	Production Planner, Materials & Logistics 1996-1997
Education:	Chartered Financial Analyst CFA Institute, 2005
	Master of Business Administration York University, 2002
	Bachelor of Commerce St. Mary's University, 1996

Memberships:	CFA Institute Toronto CFA Society
Appearances:	(Ontario Energy Board) EB-2012-0459 EB-2011-0354 EB-2010-0060 EB-2009-0172 EB-2009-0084 EB-2007-0615 EB-2005-0001 RP-2003-0203 (New York Public Service Commission) 05-G-1635 (New York Public Service Commission) 08-G-1392

CURRICULUM VITAE OF
ERIKA LONTOC

Experience: Enbridge Gas Distribution Inc.

Manager, Commercial and Low Income Programs
2015

Manager, Residential and New Construction Marketing
2012

Manager, Low Income and DSM Administration
2011

Manager, DSM Reporting and Analysis
2008

Ontario Power Authority

Manager, Low Income and Multi-residential Programs
2008

Manager, Business Market Channels, Program Operations and Sector Development
2007

Program Manager, Low Income and Social Housing Programs
2006

Enbridge Gas Distribution Inc.

Program Manager, Small Commercial and Low Income Programs
2006

Program Manager, Residential DSM
2003

Manager, Commercial Financing
1998

Canadian Imperial Bank of Commerce

Financial Analyst, Office of the CFO, Personal & Commercial Bank

Financial Analyst, Asset Based Financing, CIBC Wood Gundy Investment Bank

AT&T Capital Canada

Syndication Manager, Capital Markets

Education: Maryknoll College (Manila, Philippines)
Bachelor of Arts in Business Administration

University of Toronto, School of Continuing Studies
Strategic Leadership Advanced Certificate

Memberships: Association of Energy Services Professionals, Board Member
Association of Energy Services Professionals, Ontario Chapter, Past President
Markham Environmental Advisory Committee, 2008-2010

Appearances: None

CURRICULUM VITAE OF
KEVIN MARK

Experience:	Enbridge Gas Distribution Inc. DSM Analyst 2013 Sears Canada Associate Planner 2012 Sears Canada Merchandise Flow Analyst 2009 Hudson's Bay Company Replenishment Analyst 2008 Hudson's Bay Company Distributor 2007
Education:	Ryerson University Hon. B.Comm, Business Management With Minor in Economics
Memberships:	None
Appearances:	(Ontario Energy Board) None

CURRICULUM VITAE OF
STEVE MCGILL

Experience: Enbridge Gas Distribution Inc.

Sr. Manager, Sustainable Growth & Market Development Strategy

Sr. Manager, Customer Care Finance & Contracts, 2014

Manager, Billing & Customer Systems, 2005

Manager, Strategic Projects & Market Analysis, 2003

Manager, Customer Support & Advocacy, 2000

Manager, Customer Accounting Projects, 1995

Manager, Large Volume Billing, 1992

Manager, Industrial Sales, Metropolitan Toronto, 1990

Manager, Rate & Contract Administration, 1987

Rate Research Analyst, 1985

Market Analyst, 1981

Distribution Planner , 1979

TransCanada Pipelines Limited

Junior Statistician

Junior Draftsman

Education:	Bachelor of Arts (Honours Geography), University of Toronto, 1978 Miscellaneous short courses in Public Utility Management, General Management and Accounting
Other:	Member of the Board of Directors and Treasurer of the Oshawa Ski Club o/a Brimacombe
Appearances:	(Ontario Energy Board) EB-2012-0055 EB-2012-0459 EB-2011-0354 EB-2011-0277 EB-2011-0226 EB-2006-0034 EB-2005-0001 RP-2003-0203 RP-2002-0133 RP-2001-0032 RP-2000-0040 RP-1999-0058 RP-1999-0001 EBRO 497-01 EBRO 497 EBRO 495 EBRO 492 EBRO 490 EBRO 487 EBO 179-14/15

CURRICULUM VITAE OF
SUZETTE MILLS

Experience:	Enbridge Gas Distribution Inc.
	Senior Market Policy Advisor DSM EM&V 2012 – Present
	Senior Analyst DSM Research & Evaluation 2012
	Analyst – Intermediate Analyst DSM Research & Evaluation 2001 - 2012
	Customer Attachment / Sales Coordinator 1997-2001
	Active / Final Collections Representative, Customer Service Representative, Small Claims litigation representative 1990-1997
Education:	BA – York University Certificate – Université Canadienne en France
Memberships:	None
Appearances:	(Ontario Energy Board) None to date

CURRICULUM VITAE OF
SHARON MOFFAT

Experience:	Enbridge Gas Distribution Inc.
	Team Lead, DSM Tracking and Reporting 2012
	Senior Analyst, DSM Tracking and Reporting 2004
	Analyst, DSM Tracking and Reporting 2002
	Customer Attachment Coordinator 1995
	Sales Operator Level 3 1992
Education:	Seneca College Science and Engineering Technology, Laboratory Technician
Memberships:	None
Appearances:	None

CURRICULUM VITAE OF
DAMIR NADEN

Experience:	Enbridge Gas Distribution Inc.
	Industrial Strategic Accounts Supervisor 2012
	Industrial Energy Solutions Consultant 2009
	Meritor Suspensions Systems Company
	Project Manager, Capital Projects 2006
	Macro Engineering and Technologies, Inc.
	Project Manager, 2004
	CFM Corporation
	Product Design Manager, 2003
Education:	University Of Zagreb, Croatia - Baccalaureate Degree in Mechanical Engineering
Memberships:	Professional Engineers Ontario - Licensed Professional Engineer (P. Eng.)
	Association of Energy Engineers - Certified Energy Manager (CEM)
Appearances:	N/A (Ontario Energy Board)

CURRICULUM VITAE OF
FIONA OLIVER-GLASFORD

Experience:

Enbridge Gas Distribution Inc.

Senior Manager, Market Policy and DSM, 2013

Union Gas Distribution

Manager, CDM Business Development and Policy 2010

Manager, DSM Strategy, 2008

Manager, DSM EM&V, 2007

Manager, DSM Programs/Marketing, 2006

Manager, Market Research & Analysis, 2005

Canadian Energy Efficiency Alliance

Director, Operations

Summerhill Group

Marketing Manager

Corus Entertainment

Marketing Manager, YTV, Documentary Channel and Scream TV

Towers Watson

Associate/Analyst

Education:	York University – Schulich School of Business Masters of Business Administration With an International Exchange at Copenhagen School of Business Western University – Huron College Bachelor of Arts
Memberships:	None
Appearances:	(Ontario Energy Board) EB-2008-0346 EB-2012-0451 EB-2013-0352 EB-2014-0277 EB-2012-0459 EB-2012-0441 EB-2013-0075 EB-2013-0430

CURRICULUM VITAE OF
BRANDON OTT

Experience:	Enbridge Gas Distribution Inc. Mar 2015 – Present Lead – DSM Policy Jan 2013 – Mar 2015 Senior Market Policy Analyst – DSM Policy Just Energy Group Inc. Sep 2011 – Jan 2013 Manager – Regulatory Affairs and Government Relations Blackstone Energy Solutions Inc. May 2010 – Aug 2011 Business Development
Education:	M.A., Political Science and Environmental Studies University of Toronto, ON 2010 B.A., Political Science and Geography University of Guelph, ON 2009
Appearances:	(Ontario Energy Board) None to date

CURRICULUM VITAE OF
JAMIE PARIS

Experience: Enbridge Gas Distribution Inc.

Manager – Residential Energy Solutions
Sept 2012 – Present

Manager – Large Business Accounts
Feb 2011 – Sept 2012

Accenture Business Services for Utilities

Manager – Presto Transit Card Project
Sept 2009 – Feb 2011

Collections Manager (Manila) – United Utilities UK
Jan 2007 – Sept 2009

Work Force Planning
June 2006 – Jan 2007

Team Lead – BC Gas
Aug 2002 – June 2006

Enbridge Gas Distribution Inc.

EGD Billing Specialist
March 2001 – Aug 2002

Fantom Technologies

Accounting Clerk
1998 – 2001

Education: Niagara College
Business Administration - Accounting
1995 – 1997

Appearances: (Ontario Energy Board)
None to date

CURRICULUM VITAE OF
ED REIMER

Experience:	Enbridge Gas Distribution Inc.
	Manager, Market Development, Strategy & Stakeholder Relationships 2014
	Manager, New Construction Energy Solutions 2012
	Manager, High Performance New Construction & Channel Sales 2009
	Manager, Key Accounts 2008
	Direct Energy Inc.
	Manager, Sales 2003
	Energy Solutions Consultant 1999
Education:	Masters of Business Administration, Niagara University, NY 1996
	Bachelor of Business Administration, Brock University, ON 1990
Memberships:	Association of Energy Service Professionals (Certified Energy Manager
Appearances:	(Ontario Energy Board) None

CURRICULUM VITAE OF
RAVI SIGURDSON

Experience: Enbridge Gas Distribution Inc.

Manager, DSM Program Design, Evaluation & Audit
2015

Manager, DSM Evaluation, Monitoring, Verification & Policy
2013-2015

Manager, DSM Evaluation, Monitoring & Verification
2012

Union Gas Ltd.

Manager, DSM Research & Evaluation
2008 - 2009

Manager, Market Research & Analysis
2007

Senior Program Manager, Residential Marketing
2006

Commercial/Industrial Category Marketing Specialist
2003 – 2005

Imperial Oil Ltd.

Project Manager & Communications Specialist
2002

Business Analyst
2000 – 2001

Information Systems Analyst/Database Developer
1999

Education: M.B.A. – Major in Information Technology & Systems; Minor in Operations Management
McMaster University
1999

B.A. – Economics
York University
1995

Memberships: Canadian Energy Efficiency Alliance

Appearances: (Ontario Energy Board)
EB-2012-0394
EB-2013-0352
EB-2013-0430
EB-2014-0277
EB-2014-0354

CURRICULUM VITAE OF
HILARY THOMPSON

Experience:	Enbridge Gas Distribution Inc.
	Manager, Distribution Planning, 2014
	Manager, Regulatory Projects, 2012
	Manager, Technical Services, 2011
	Field Manager, Measurement & Regulation, 2011
	Senior Engineering Project Leader, Measurement & Regulation, 2010
	Senior Engineering Project Leader, Special Projects, 2008
	Engineering Project Leader, Special Projects, 2007
	Engineering Project Leader, Engineering Standards & Technical Services 2006
Education:	University of Toronto – Faculty of Law Global Professional Master of Laws
	Queen's University – Faculty of Applied Science Bachelor of Science, Chemical Engineering
Memberships:	Professional Engineers Ontario (P.Eng. Licence Holder)
Appearances:	(Ontario Energy Board) None

CURRICULUM VITAE OF
Aqeel Zaidi

Experience:

Enbridge Gas Distribution Inc.

Energy Solutions Manager, 2006

Union Gas Distribution, Centra Gas Ontario, ICG

Project Manager, Key Industrial Accounts, 1998

Senior Engineer, Technology and Market Development, 1989

NRCan (formerly Energy Mines and Resources Canada)

Project Engineer, Conservation and Renewable Energy Office, Toronto, 1987

Admic Control, Toronto

Project Engineer, 1986

G. K. Yuill and Associate, Winnipeg

Project Engineer, 1985

Wardrop Engineering, Winnipeg

Project Engineer, 1981

University of Manitoba, Winnipeg

Teaching Assistant, 1978

Greaves Cotton Air-conditioning, Pakistan

Mechanical Engineer, 1977

Education: University of Manitoba
M.Sc. Mechanical Engineering
(Heat Transfer and Fluid Flow)

University of Engineering and Technology, Lahore, Pakistan
B.Sc. Mechanical Engineering

Memberships:

Member: Professional Engineers of Ontario

Member: Ontario Society of Professional Engineers

Member: Association of Energy Engineers

Charter Member: Institute of Energy Managers

Member: Pulp and Paper Technical Association of Canada (Paptac)

Member: Energy Solutions Center (ESC), Washington, DC

Chair: Boiler Burner Consortium, ESC, Washington, DC

Past Chair: Gas IR Paper Drying Consortium, ESC

Past Chair: Energy Community, Paptac, Recipient of 2012 F.G. Robinson Award

Invited Lecturer: Gas Technology Institute, Chicago, Chartered Industrial Gas Consultants (CIGC) Program

Appearances: (Ontario Energy Board)

None

CURRICULUM VITAE OF
H. ROBERT BACH

Experience:

Energy Profiles Limited

Senior Associate;
Responsible for Sustainable Building programs, DSM, CDM and Municipal Energy and Water Efficiency programs, New Building Design Energy Codes and Standards, and Energy Efficiency Training program development and delivery.

2004 to the present

Engineering Interface Limited

Senior Consultant;
Responsible for Sustainable Building programs, DSM and Municipal Energy and Water Efficiency programs, New Building Design Energy Codes and Standards, and Building Environmental Management Systems.

1991 - 2004

Service Canada Inc.

President and Owner;
HVAC Contractor franchise system.
Independent consulting company.

1989 to the present

HRAI Technical Services Division Inc.

President

Subsidiary of the Heating, Refrigerating and Air Conditioning Institute of Canada, formed to manage the R2000 ventilation and Residential HVAC energy efficiency programs.

1986 – 1989

Atlas Air Conditioning Company

President and Owner

Toronto based HVAC design/build contractor

1967 - 1986

Education:	BA Sc., Mechanical Engineering (Honours) University of Toronto
Memberships:	Professional Engineers Ontario 1963 to the present Life Member, American Society of Heating, Refrigerating and Air Conditioning Engineers 1974 to the present Founding Director and Treasurer, Sustainable Buildings Canada 2003 to the present Founding co-chair and current vice-chair, energy, Building Code Conservation Advisory Council 2010 to the present Member, IESO/OPA Advisory Council on Conservation 2013 to the present
Appearances:	(Ontario Energy Board) EB-2012-0064 Represented HRAI and the Metro-Toronto HVAC Contractors against Consumers Gas, 1985

CURRICULUM VITAE OF
R. TYLER CURTIS

Experience:	Opower
	Senior Director, Program Design 2013
	Senior Director, Advanced Analytics 2008
	Amazon.com
	Senior Product Manager, Global Payment Services 2007
	Capital One Financial
	Director, Credit Risk Management 2003
	Senior Manager/Director, Capital One Mortgage 2001
	Business Analyst/Senior Manager, Capital One Auto Finance 1999
Education:	Duke University – Schulich School of Business B.S.E. Electrical Computer Engineering, Magna Cum Laude
Memberships:	None
Appearances:	(Ontario Energy Board) None

CURRICULUM VITAE OF
MICHAEL SINGLETON

Experience: SeeLine Group Ltd.

Principal, 2005 - Present

Sustainable Buildings Canada

Executive Director, 2003 to Present

Canadian Energy Efficiency Centre

Director, 2001 - 2005

Jacques Whitford Environment Ltd.

Senior Economist, 2000 -2001

Future Thoughts Consulting

President, 1995 - 2000

Ontario Hydro

Senior Analyst, 1986 - 1995

Education: B.A. Hons, Economics

Memberships: North American Electricity Reliability Council – Former Board Member
American Council for an Energy Efficient Economy – Former Board Member

Appearances: Gazifère Rate Hearing - DSM Plan Submission to the Régie, 2000 – 2001

Toronto Hydro – SSM & LRAM Submissions to the OEB, 2007

CURRICULUM VITAE OF
CORY J. WELCH

Experience:	Navigant Consulting, Inc.
	Director
	Associate Director
	Summit Blue Consulting
	Managing Consultant
	National Renewable Energy Laboratory
	Senior Energy Analyst
	UTC Fuel Cells (now UTC Power)
	Program Manager
	US Navy
	Fluid Systems Engineer (Mechanical/Nuclear)
Education:	MS, Mechanical Engineering, Massachusetts Institute of Technology MBA, Massachusetts Institute of Technology's Sloan School of Management BS, Mechanical Engineering, Cornell University (with distinction)
Memberships:	Association of Energy Service Professionals (2007-15) Systems Dynamics Society (2004-15) Tau Beta Pi National Engineering Honor Society (1999-94)

Publications/Projects:

Incentive Scenarios in Potential Studies: A Smarter Approach (American Council for Energy Efficient Economy (ACEEE) Summer Study on Energy Efficiency in Buildings)

Estimating the Remaining Useful Life of Residential Appliances (American Council for an Energy Efficient Economy (ACEEE) Summer Study on Energy Efficiency in Buildings)

SolarSIM: A Dynamic Technology Diffusion Model Simulating Adoption of Distributed Solar PV, Solar Hot Water, and Daylighting (Electric Utility and Environment (EUEC) Conference)

Estimating Demand Response Potential for Resource Planning (AESP 19th National Energy Services Conference & Expo)

Estimating Regional and Utility Demand Response Potential - A Case Study at ConEdison. (Peak Load Management Alliance Conference)

Quantifying Consumer Sensitivity to Hydrogen Refueling Station Coverage. (U.S.Department of Energy's Annual Hydrogen Program Merit Review)

CURRICULUM VITAE OF
TODD S. WILLIAMS

Experience:	Navigant Consulting Ltd. (Toronto)
	Managing Director
	SRC International Pty Ltd (Melbourne).
	Manager
	Synergic Resources Corporation (Philadelphia).
	Product Manager
	Ontario Hydro (Toronto).
	Project Manager, Customer/Sales Management System
	Superintendent, Residential Program Support
	Senior Supervisor, Program Management Divisional Services
	Market Planner, Western Region
	Program Supervisor, Energy Management
	Nuclear Design Engineer
Education:	B.Sc. Honours (Engineering Physics), Queen's University, MBA, University of Western Ontario
Memberships:	Professional Engineers of Ontario

Publications / Projects

Hydro One CDM Achievable Potential (Hydro One Networks Inc.)

Time of Use Rates In Ontario (Part 1: Impact Analysis) (Ontario Energy Board)

Avoided Cost Analysis for the Evaluation of CDN Measures (Hydro One Networks Inc.)

Benefits of Smart Meters for Ontario (Ontario Ministry of Energy)
Blueprint for Demand Response in Ontario (Independent Electricity Market Operator)

Development and delivery of various residential, commercial and industrial DSM programs (Ontario Hydro)

Principles of DSM - Training in Pacific Islands

Y9 Tariff Project Monitoring (water heater load shifting program design and evaluation)

Demand Side Management in the Philippines (contribution to report for World Bank)

Energy End-Use Database for Hong Kong (structural and sampling frame design)

Demand Management Program Monitoring System (DSM tracking system for SEQEB)

Capacity Support Bid Development (demand-side bid to Victorian Power Exchange by Powercor, a Victorian retailer)

Appearances:

Date	Subject of Testimony	Jurisdiction	Docket Number / Case
December 2012	Incremental capital spending and rate relief under the Board's Incremental Capital Module framework	Ontario Energy Board	EB-2012-0064
February 2010	System plans to enable distributed generation	Ontario Energy Board	EB-2009-0139
December 2005	Energy efficiency spending by local distribution companies	Ontario Energy Board	RP-2005-0020 EB-2005-0523
April 2003	Regulatory framework for energy efficiency delivered by natural gas utilities	Ontario Energy Board	RP-2002-0133
July 2012	Load Retention Tariff for large paper mill	Nova Scotia Utility and Review Board	NSPI – P-203 / M04862
June 2014	Power purchase rates under a Non-Utility Generation Contract	Ontario Superior Court of Justice	Elliott Falls Power Corporation -and- Ontario Electricity Financial Corporation, Ontario Power Generation Inc., Hydro One Inc., Independent Electricity System Operator, and Electricity Safety Authority
January 2014	Ongoing operations of hydro-electric generating facilities under merchant operation	Ontario Superior Court of Justice	Grand Council Treaty #3 and various associated parties -and- Ontario Minister of Energy and Ontario Power Authority -and- H20 Power Limited Partnership and Resolute FP Canada Inc.

Date	Subject of Testimony	Jurisdiction	Docket Number / Case
July 2013	Impact of changes in electricity rates for large industrial customers on power purchase rates under a Non-Utility-Generation contract	Ontario Superior Court of Justice	Various Non-Utility Generators - and - Ontario Electricity Financial Corporation
October 2008	Power Purchase Rates under a Non-Utility Generation Contract	Ontario Superior Court of Justice	Eastern Power Limited -and- Ontario Electricity Financial Corporation
November 2007	Tolling contract repudiation claim	Court of Queen's Bench of Alberta	CALPIINE POWER,, L.P. Repudiation Claim Against Calpine Energy Services Canada Partnership

CURRICULUM VITAE OF
TRENT WINSTONE

Experience:	Navigant Consulting Ltd.
	Associate Director
	BDR NorthAmerica Inc.
	Partner
	Hatch Management Consulting Ltd.
	Senior Consultant
	Enbridge Gas Distribution Inc.
	Supervisor, Financial Studies
Education:	Bachelor of Engineering Science (Civil), The University of Western Ontario MBA (Finance), Queens University
Memberships:	Professional Engineers of Ontario
Appearances:	(Ontario Energy Board) While employed at Enbridge Gas Distribution (1995 to 2000), appeared as an expert witness for various Leave to Construct Applications (both written and oral)

GLOSSARY OF TERMS

1. Administrative Costs

Expenses incurred by a utility for offer planning, design, management and administration. These costs include general overhead costs required to implement an offer, but do not include direct offer costs such as purchasing or incentives and indirect costs such as marketing, monitoring, and evaluation costs.

2. Avoided Cost

The unit cost of acquiring the next resource to meet demand, which is used as a measure for evaluating individual demand-side and supply-side options. Avoided cost is the expenditure offset by Enbridge Gas Distribution Inc.'s ("Enbridge") demand side management ("DSM") activities (i.e., the cost of having to buy natural gas on the open market, contract for long-term supply, and the cost of associated transmission and storage). For the purpose of the Total Resource Cost ("TRC") test outlined below, Avoided Costs are calculated for natural gas, electricity and water.

3. Benefit/Cost Ratio

The measure benefit/cost ratio indicates the relative attractiveness of the measures. For the purposes of DSM assessments, the benefit/cost ratio is typically associated with the analysis undertaken as part of the TRC test.
A measure that has a benefit/cost ratio in excess of 1.0 has benefits which outweigh its costs. Similarly, a measure with a benefit/cost ratio that is well in excess of one (e.g., 3.0) means that it is very attractive. A measure with a benefit / cost ratio of less than 1.0 has costs which outweigh its benefits. In some instances, such as Low Income DSM, other benefits that are not quantified may justify a benefit/cost ratio of less than 1.0.

4. <u>Building Envelope</u>

   The material separation between the interior and the exterior environments of a building. The building envelope serves as the outer shell to protect the indoor environment as well as to facilitate its climate control.

5. <u>Cumulative Natural Gas Savings</u>

   Natural gas savings over the life of a DSM measure or activity. The unit Enbridge uses to measure this amount is a cumulative cubic meter (“CCM”) of natural gas.

6. <u>Deep Energy Savings</u>

   Refers to measures that result in longer-term natural gas savings, such as thermal envelope improvements (e.g., wall and attic insulation).

7. <u>Demand Side Management (“DSM”)</u>

   Actions taken by utility or other agencies that are expected to influence the amount or timing of a customer’s energy consumption.

8. <u>DSM Plan</u>

   A strategic plan which sets objectives and directs and controls the implementation, monitoring, and improvement of a utility’s DSM Portfolio.

9. <u>DSM Portfolio</u>

   A group of DSM offers which have been selected and combined in order to achieve the objectives of a utility’s DSM Plan.

10. DSM Offer

One or more DSM activities or measures which a utility may use to affect a specifically identified target market in their choices around the amount and timing of energy consumption.

11. Discount Rate

The adjustment rate used to translate the value of benefits in future years into present day value.

12. Energy Audit

An on-site inspection and cataloguing of energy, using equipment/buildings, energy consumption and the related end-uses. The purpose is to provide information to the customer and the utility. Audits are typically useful for DSM offer design and the identification of specific energy savings measures.

13. End Use

The final application or final use to which energy is applied (e.g. water heating or space heating).

14. Energy Savings

The reduction in use of energy from the pre-measure to post measure, that result results from efficient technologies or activities.

15. Financial Incentive

Certain financial features in the utility's DSM offers designed to motivate customer participation (e.g. rebates, contributions towards more efficient measures or practices, etc.).

16. Franchise Area

The portion of the Province of Ontario that receives service from Enbridge (also referred to as “service territory”).

17. Free Rider

A DSM offer participant who would have implemented the offer measure or practice in the absence of the DSM offer. Savings attributed to a DSM offer are often adjusted downward to account for a deemed level of free ridership.

18. Gross Savings

Energy or natural gas savings that have not been adjusted for free ridership or other adjustment factors as necessary.

19. Local Distribution Companies (“LDCs”)

Electricity utilities responsible for distributing power from transmission lines to customers, as well as delivering Conservation and Demand Management (“CDM”) programs.

20. Lost Opportunity

DSM opportunities that, if not undertaken during a current planning period, will no longer be available or will be substantially more expensive to implement in a subsequent planning period.

21. Market Transformation Offers

Market transformation offers are focused on facilitating fundamental changes that lead to greater market shares of energy-efficient products and services, and on influencing consumer behaviour and attitudes that support reduction in natural gas consumption. They are designed to make a permanent change in the marketplace over a long period of time.

22. Net Savings

Energy or natural gas savings that have been adjusted for free ridership or other adjustment factors as necessary.

23. Non Energy Benefits ("NEBs")

The wider socio-economic or environmental outcomes that arise from energy efficiency improvements, aside from energy savings. NEBs can include, but are not limited to impacts such as job creation and greenhouse gas reduction. For example, offer participants may benefit from increased property value, and improved health and comfort.

24. Program

For purposes of the multi-year plan, Enbridge has defined its separate scorecards as Programs. For example, the Resource Acquisition Program, the Low Income Program, and the Market Transformation and Energy Management Program.

25. Program Administrator Cost (PAC) Test

Measures the utility's avoided costs and the costs of DSM programs experienced by the utility system. Under this test, benefits are driven by avoided utility costs, including avoided energy costs, capacity costs, transmission and distribution costs and any other avoided costs incurred by the utility to provide its customers with natural gas services. The costs included in the PAC test calculation include all expenditures by the utility to administer DSM programs (i.e., costs to design, plan, administer, deliver, monitor and evaluate).

26. Participant

An individual, household, business or other utility customer that received a service or financial assistance through a particular utility DSM offer, set of utility offers or particular aspect of a utility offer in a given year.

27. Rebates

A financial incentive provided to encourage the adoption of energy efficient technologies or practices, typically paid after the activity has been undertaken. There are typically two types of rebates: a Prescriptive Rebate, which is a prescribed financial incentive per unit for a specific product or outcome, and a Custom Rebate, in which the financial incentive is determined using an analysis of the customer equipment and energy savings from a specific project.

28. Resource Acquisition Offers

Are offers that seek to achieve direct, measurable savings customer-by customer and involve the installation of energy saving equipment or materials.

29. Retrofit

Energy efficiency activities undertaken in existing residential or non-residential buildings where existing less efficient equipment is replaced by more efficient equipment. In the DSM context, a retrofit is often distinguished from a "replacement" wherein the timing of the retrofit is discretionary while the replacement is required when the equipment fails.

30. Sector

A group of customers having a common type of economic activity. The most common sectors referenced are residential, commercial and industrial.

31. <u>Spillover Effects</u>

Collateral energy savings resulting from individuals or businesses who adopt energy efficient measures or behaviours because they are influenced by a utility offer (e.g., marketing, information, and communication with participants), but in the absence of direct motivation (e.g., incentives, and direct participation in offer for the project/initiative in question).

32. <u>Total Resource Cost ("TRC") Plus Test</u>

The TRC Plus test measures the benefits and costs of DSM programs for as long as those benefits and costs persist and applies a 15% non-energy benefit adder. Under this test, benefits are driven by avoided resource costs, which are based on the marginal costs avoided by not producing and delivering the next unit of natural gas to the customer. Those marginal costs avoided include the natural gas commodity costs (both system and customer) and transmission and distribution system costs (e.g., pipes, and storage, etc.). The marginal costs also include the benefits of other resources saved through the DSM program, such as electricity, water, propane and heating fuel oil, as applicable.

CURRICULUM VITAE OF
TERRENCE JAMES WHITEHEAD

Experience:

Enbridge Gas Distribution Inc.

Team Lead Commercial Programs, 2013

Manager, DSM Standards, 2007

Program Manager, Power Generation, 2002

Manager Distributed Energies Applications and Technology, 2001

Program Manager, Power Generation, 2000

Program Manager, Space Conditioning and Venting Programs 1995

Project Manager, Residential and Commercial Projects 1990

Triton Engineering Services Limited.

Senior Structural Engineer, 1989-1990

Fibrecrete International Inc.

Senior Engineer, 1988-1989

Dow Chemical Canada Inc.

Research Engineer, 1985-1988
Civil Design Engineer, 1980-1985

Education:

Certified Energy Manager (CEM) 2008

Certified Measurement and Verification Professional (CMVP) 2010
Bachelor of Applied Sciences BASc
University of Waterloo, 1980

Memberships:	American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE)
	Professional Engineers of Ontario (PEO)
	Association of Energy Engineers (AEE)
	Canadian Standards Association (CSA) Technical Committee on Energy Efficiency and Related Performance of Fuel-Burning Appliances and Equipment (JB121)
Appearances:	(None)

CURRICULUM VITAE OF
PIRAPA THARMALINGAM

Experience:	Enbridge Gas Distribution Inc.
	Lead, Business intelligence, 2013 - Present
	Advisor, Load Research, 2009-2013
	Sr. Analyst, Load Research, 2006- 2009
	Market Analyst, Economic and Market Analysis, 2004 – 2006
	Robert Greene Associates
	Investment Planning Analyst, 2003 - 2004
Education:	Master of Arts – Applied Economics University of Waterloo, 2003
	Bachelor of Arts – Economics and Computer Science McMaster University, 2001
Memberships:	Toronto Association of Business Economics 2003 – 2005 Association of Edison Illuminating Companies, 2004 - 2013
Appearances:	(None)

BACKGROUND AND CONTEXT

1. The first regulatory framework governing demand side management ("DSM") activities in Ontario's natural gas sector was established in 1993 under EBO 169-III. Since that time, Enbridge Gas Distribution Inc. ("Enbridge" or the "Company") has been an ardent supporter of the efficient use of natural gas and the associated reductions in greenhouse gas emissions which the Company helps to facilitate. Between 1995 and the end of 2013 Enbridge helped its customers to save approximately 8.8 billion m3 of natural gas; the equivalent of 16.5 million tonnes of atmospheric carbon dioxide.[1] The Company is proud of its energy efficiency efforts to date, and intends to play an integral role in the Province's efforts to combat climate change in the years to come.[2]

2. Support and guidance for natural gas utilities offering demand side management ('DSM") programs has been provided by the Ontario Energy Board ("Board") since 1993, largely through the release of guidelines, DSM frameworks, and other directional documents. Further, it is the Board's responsibility to ensure that the DSM plans of the gas utilities and component parts are appropriate and in the public interest.

3. In 2006, the Board conducted a generic proceeding under case number EB-2006-0021 which led to the gas utilities filing three-year DSM plans beginning in 2007. These DSM plans, scheduled to expire in 2009, were subsequently approved by the Board.

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[1] Assumes 1.89kg of CO2 are emitted for each m3 gas that is consumed
[2] Ministry of the Environment and Climate Change (2015) *"Ontario's Climate Change: Discussion Paper 2015,"* Government of Ontario, p. 38, para 1

4. In 2008, the Board commenced a consultation process to develop another set of guidelines to aid the natural gas utilities in the creation of their next generation of DSM plans. However, with the introduction of the Ontario Government's *Green Energy and Green Economy Act,* the Board decided to extend the 2006 framework to allow time for the impact of this new legislation to become clearer. Under the same framework the natural gas utilities were asked to extend their three-year DSM plans first for one year, covering the 2010 calendar year, and then for a second year, covering the calendar year 2011. In 2010, Enbridge took a strict formulaic approach to rolling-over its DSM portfolio, budgets and targets. In 2011, Enbridge proactively sought the input of stakeholders in creating a new, custom solution that met the needs of utility customers, interest groups and shareholders.

5. On June 30, 2011, the Board issued new DSM Guidelines for the next multi-year plan period titled the *2012 Demand Side Management Guidelines for Natural Gas Utilities* ("2012 to 2014 DSM Guidelines") and directed the utilities to file their plans with the Board by September 15, 2011. The 2012 to 2014 DSM Guidelines retained the use of the Total Resource Cost Test ("TRC test") for the purpose of establishing cost-effectiveness, but determined that utility performance would be evaluated on a weighted scorecard basis which should include metrics for lifetime natural gas reductions amongst metrics which measure alternative objectives. The three main objectives of the 2012 to 2014 DSM Guidelines were:
   - Maximization of cost-effective natural gas savings;
   - Prevention of lost opportunities; and
   - Pursuit of deep energy savings (i.e. long-term natural gas savings)

6. The 2012 to 2014 DSM Guidelines also established a budget cap for DSM activities, which equaled approximately $30.9 million in 2012.[3]

7. Enbridge undertook an extensive consultation process during the plan development phase and, following the Company's requests, the Board extended the filing date for the Company's DSM plan ("2012 DSM Plan") to November 4, 2011.

8. In the summer and fall of 2011, details of the Enbridge 2012 DSM Plan were developed through extensive negotiations with the members of the DSM Consultative. The Company invited Intervenors to form small working groups with the goal of achieving agreement on the 2012 DSM Plan budget allocation, scorecards, metrics and targets.

9. The result of the collaborative discussions was a 2012 Settlement Agreement on the budget allocation, metrics, and targets for the 2012 year. Participants to the 2012 Settlement Agreement acknowledged that the evidence in the 2012 to 2014 Plan submission provided a basis for the Board to approve the Settlement Agreement.

10. On November 4, 2011, in response to the 2012-2014 DSM Guidelines, Enbridge submitted a plan outlining its proposed DSM activities for the period 2012 to 2014 (EB-2011-0295).[4] As described in the submission, the 2012 DSM Plan reflected

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[3] The budget cap for Enbridge was established as $28.1 million. However, the Board also provided that the utilities may increase their budget caps by 10% provided that all additional funds were directed toward low income DSM. Enbridge exercised this option, increasing their budget and maximum shareholder incentive by 10%.

[4] The previous guidelines were developed in the Natural Gas Demand Side Management Generic Issues proceeding (EB-2006-0021) and were originally intended to apply to the three-year period 2007 through to 2009.

the agreement reached on customer offerings, program budgets, metrics, and targets. It also included several features that were developed through the consultation process. A separate budget cap was included for rate classes with large industrial customers, and a new set of market transformation programs were approved.[5]

11. On February 28, 2013, and in accordance with the Board Guidelines, Enbridge filed an update to the 2012 DSM Plan (EB-2012-0394). While Enbridge's original 2012 to 2014 DSM Plan outlined the activities which the Company intended to undertake throughout the multi-year period, the only financial components (i.e. budgets, targets, shareholder incentive) included related to 2012 alone. The 2013-2014 DSM Plan Update provided the financial package relevant to 2013 and 2014 as well as some minor changes and evolutions to program components.

12. On March 31, 2014, the Minister of Energy issued a Directive to the Board calling for the development of a new DSM policy framework. This new framework was to span a period of six years beginning January 1, 2015 and, among other things, enable the achievement of all cost-effective DSM.

13. On April 25, June 18, and July 25 of 2014, the Board convened a small working group of stakeholders, inclusive of the natural gas utilities, to receive early input on the direction that its new DSM framework should take.

14. On September 15, 2014 the Board issued a *Draft Report of the Board outlining its proposed 2015 to 2020 DSM Framework for Natural Gas Distributors* (EB-2014-0134) and called upon all interested parties to provide comment.

[5] Including one program, (Home Labelling) which was developed during the consultation.

15. On October 15, 2014, Enbridge, Union Gas Limited, and a wide variety of stakeholders provided comments on the Board's proposed 2015 to 2020 DSM Framework. An important element of Enbridge's submission was a request that 2015 be treated as a Transition Year, as 2015 is the first year of the 2015 to 2020 DSM Framework. Among other reasons, Enbridge made this request to satisfy the market's need for certainty and demonstrate that the current DSM consultation process could continue to yield efficient and effective outcomes.

16. Throughout 2014, Enbridge engaged in significant stakeholder consultation with its customers, channel partners, delivery agents and Intervenors. In the fall of 2014, Enbridge held seven program design roundtables to gain insight on proposed program approaches, followed by a discovery and discussion session regarding financing in January of 2015. A summary of those discussions was presented to the full DSM Consultative group on December 2, 2014. Further detail regarding Enbridge's stakeholder consultation efforts are provided in Exhibit B, Tab 3, Schedule 2.

17. On December 22, 2014, the Board released the EB-2014-0134, *Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020)* ("DSM Framework") and an accompanying set of Filing Guidelines. The Framework has been designed to reduce natural gas consumption throughout Ontario and covers the same time period as the Conservation First framework for electricity distributors. Its ultimate goal is to ensure that resource savings are achieved in an efficient manner and that customers receive the greatest and most meaningful opportunities to lower their bills by reducing consumption. As per the Minister of Energy's Conservation Directive, the term of the DSM Framework is six

years, from January 1, 2015 to December 31, 2020, with a mid-term review completed by June 1, 2018.

18. As outlined in the DSM Framework, the Board believes that ratepayer funded DSM programs should focus on the following goals:

    i. Assist consumers in managing their energy bills through the reduction of natural gas consumption. Customers who participate in the DSM programs should see a decrease in their energy bills.

    ii. Promote energy conservation and energy efficiency to create a culture of conservation. DSM programs should advance conservation and energy efficiency beyond the program participants to the broader public in Ontario.

    iii. Avoid costs related to future natural gas infrastructure investment, thus improving the load factor of natural gas systems. Gas utilities are expected to consider DSM initiatives in the context of infrastructure planning to help avoid or defer future infrastructure costs. This is consistent with the government policy of "Conservation First."[6]

19. Section 15.1 of the DSMFramework provided the Board's direction regarding DSM activities in 2015, calling for 2014 DSM activities to be rolled forward into 2015 in order to help facilitate a smooth evolution into the new DSM Framework. Specifically, the Board requested that the gas utilities increase their budgets, targets and shareholder incentive amounts in the same manner as they did to transition from 2013 to 2014. Enbridge's 2015 budgets and targets can be found in Exhibit B, Tab 1, Schedule 4.

[6] EB-2014-0134, "*Report of the Board DSM Framework for Natural Gas Distributors 2015 – 2020*", December 22, 2015, p. 5

20. Enbridge respects the Board's direction to the gas utilities that DSM budgets and targets should not be the subject of a settlement. An agreement which provided for alternative budgets and targets for the 2015 Transition Year was the main object of the Company's Stakeholdering efforts throughout the months of January, February and March of 2015. Despite the best of efforts and intentions, such an agreement did not materialize.

21. Enbridge also consulted with intervenors regarding DSM program details for the years 2016 to 2020 during March 2015. These discussions were curtailed as a result of Enbridge's request for an extension being denied. These discussions were a final consulting effort with intervenors and, in a way, represented the culmination of a wide variety of broader stakeholdering efforts which began in December 2013.

22. This submission outlines Enbridge's proposal for a DSM Plan spanning from 2015 to 2020. The Company has carefully considered both the guiding principles and the key priorities outlined in the Framework. Within Exhibit B, Tab 1, Schedule 2, Enbridge has outlined how this Multi-Year DSM plan is responsive to the Board's direction and fully addresses the guiding principles and key priorities of the 2015 to 2020 DSM Framework.

Witnesses: M. Lister
F. Oliver Glasford
B. Ott

DSM PLAN OVERVIEW AND GUIDING PRINCIPLES/BOARD PRIORITIES

Introduction

1. Enbridge Gas Distribution Inc. ("Enbridge" or the "Company") is filing this 2015 to 2020 Multi-Year Demand Side Management ("DSM") Plan in response to the December 22, 2014, Ontario Energy Board's (the "Board") EB-2014-0134, *Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020)* ("DSM Framework") and *Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020)* ("DSM Filing Guidelines"). For the purposes of this filing, Enbridge draws upon 20 years of experience in the design and delivery of DSM programming in Ontario. Enbridge submits this 2015 to 2020 Multi-Year DSM Plan for the Board's consideration and approval.

2. In this filing, Enbridge proposes annual targets, metrics, and associated budgets for the 2015 to 2020 period, as well as identifying a 2020 Natural Gas Savings Goal ("2020 Goal"). The 2020 Goal provides a means for communicating the value, importance, and success of natural gas DSM in Ontario, and has been derived as a ground up summation of annual Cumulative Cubic Meters ("CCM") targets for the Multi-Year period. Annual programs, savings, and budgets have been developed using the guiding principles and key priorities outlined by the Board in Sections 2.0 and 6.2 of the DSM Framework. These values were also informed by Enbridge's proactive stakeholdering and research efforts in this area.

3. A high level summary of the proposed targets and budgets, including the 2020 Goal, is set out in Table 1 on the following page. A more detailed review of budgets, metrics, and targets can be found at Exhibit B, Tab 1, Schedule 4, Budgets, Metrics and Targets, and of programs at Exhibit B, Tab 2, Schedule 1, Offer Descriptions.

Witnesses: M. Lister
F. Oliver-Glasford

Table 1: 2020 Goal and Annual Budgets and CCM Targets

Year	Budget ($ millions)	Cumulative Cubic Metres
2015	**$37,722,230**	**774,359,281**
2016	**$63,535,727**	**1,001,743,852**
2017	**$73,826,882**	**1,083,061,000**
2018	**$79,680,131**	**1,147,902,770**
2019	**$81,273,733**	**1,165,771,091**
2020	**$82,899,208**	**1,182,290,348**
2020 Natural Gas Savings Goal (m^3)		**6,355,128,342**

4. To establish context and orders of magnitude, a 2020 Goal of natural gas reductions through the Company's Multi-Year DSM efforts of 6.36 billion m^3 is the equivalent of removing nearly 2.6 million homes from the natural gas system for an entire year[1]. Likewise if translated into carbon emission reductions, the Company's 2020 Goal is the equivalent of reducing carbon emissions by 12 million tonnes[2], which translates to the removal of nearly 2.4 million cars from Ontario roads for a full year.[3] These carbon emission reductions will likely be of great assistance to the Province in pursuit of its greenhouse gas emission goals.

5. Of the total 2020 Goal, 774 million m^3 are derived from 2015. As a result of efforts from 2016 through 2020, 3,053 million m^3 will be contributed by large commercial and industrial customers in continuation of Enbridge's historical success working within this market segment to reduce consumption. A further 883 million m^3 will be

[1] Assumes each home uses 2,400 m^3 per year. This is the typical annual usage Enbridge reports for its Rate 1 residential customers.
[2] Assumes that each m^3 of natural gas consumed results in 1.89kg of carbon equivalent emissions, as per *Guideline for Greenhouse Gas Emissions Reporting* (as set out under Ontario Regulation 452/09 under the Environmental Protection Act), Appendix 10; ON.20, General Stationary Combustion, Calculation Methodology 1, Ontario Ministry of the Environment, December 2009, PIBS# 7308e.
[3] Assumes that the average automobile emits 5.1 tonnes of carbon equivalent emissions in a given year.

contributed by smaller commercial and industrial customers as the Company increases efforts during its Multi-Year DSM Plan to engage this hard-to-reach market. A significant contribution will be made by the residential sector - by far Enbridge's largest customer segment by number of customers. Residential customers will contribute 1,160 million m^3, inclusive of the Company's new My Home Health Record behavioural offer which will pair measureable natural gas reductions with significant energy literacy activities. Lastly, the more challenging to serve but critical Low Income sector will contribute 485 million m^3 towards the total 2020 Goal. The table below outlines the aforementioned target contributions.

Table 2: 2020 Goal and CCM Contributor

Contributor	CCM
2015 Transition Year*	774,359,281
Large C/I	3,053,046,721
Small C/I	882,516,626
Residential	1,064,112,689
Low Income Multi-Family	335,460,721
Low Income Single Family	149,291,870
MTEM	96,340,435
Total Lifetime Net Natural Gas Savings from 2015 - 2020 DSM Programs (m^3)	**6,355,128,342**

*Based on preliminary and unaudited 2014 results escalated by 2%

6. In the DSM Framework, the Board provided clarity on the guiding principles and key priorities that the gas utilities must consider when preparing their multi-year plans. In this Exhibit, Enbridge outlines how it has considered and comprehensively addressed the guiding principles and key priorities stated in the DSM Framework, with further details interspersed throughout the filing. In

approaching its six year plan, in addition to addressing the Board's guiding principles and key priorities, Enbridge has drawn input from a wide variety of inputs, including:

(a) Enbridge's most recent potential study;

(b) Consultation with customers and business partners;

(c) Consultation with intervenors;

(d) Past results and trends in Enbridge's level of achievement and cost-effectiveness;

(e) The Board's guiding principles and key priorities as outlined in the DSM Framework;

(f) The Board's annual DSM budget cap for Enbridge and guidance on appropriate rate impacts for average residential customers; and

(g) Enbridge's knowledge and experience with its customer base and the market.

7. The above-noted inputs have been compiled and synthesized into several themes that have informed the Company's planning. These themes are discussed below in more detail and provide context for some key features and highlights of Enbridge's DSM portfolio in 2016 and beyond. These include:

(a) A more balanced portfolio which values the achievement of all cost-effective DSM as opposed to only those opportunities with the highest levels of cost-effectiveness;

(b) An aggressive ramp-up of holistic programming which seeks to limit lost opportunities, enable deep long-lasting natural gas savings, and identify all natural gas savings opportunities within a customer's home or business;

(c) A new focus on consumer education and energy literacy, including the empowerment of natural gas users with customer specific data;

(d) An increased focus on small commercial and industrial customers, with the inclusion of tailored offerings and mechanisms to incent achievement in this challenging market segment;

(e) An increased and, in some markets, entirely new emphasis on data-driven offers to enable operational and behavioural natural gas savings;

(f) A re-invigorated portfolio of new construction offers to avoid lost opportunities;

(g) A dedicated Collaboration and Innovation Fund to explore and implement collaborative and innovative technologies and market approaches; and

(h) The sustained achievement of highly cost-effective natural gas reductions working with Enbridge's largest commercial and industrial customers.

8. A summary of the stakeholder engagement which informed this Multi-Year DSM Plan is detailed in Exhibit B, Tab 3, Schedule 2, Retrospective Stakeholdering. The evolution of Enbridge's programming is summarized in this Overview and detailed in Offer Descriptions filed at Exhibit B, Tab 2, Schedule 1.

9. Other priority areas or topics of note, including Evaluation, Carbon Policy, Green Button, Financing/On-Bill Financing, Integrated Resource Planning ("IRP"), Enbridge's DSM Potential Study, Avoided Costs and Collaboration, are likewise detailed in discrete Schedules filed at Exhibit B, Tabs 3 and 4. The Company's Evaluation Plan is found at Exhibit B, Tab 2, Schedule 2.

10. As guided by the DSM Framework, Enbridge believes that a measured evolutionary approach to the DSM portfolio creates an optimal portfolio for ratepayers and environmental interests by: i) creating continuity and stability in the marketplace for successful DSM offers that are currently supported by customers; ii) fostering innovative thinking; iii) safeguarding rates from unpredictability in spending; and iv) driving significant verified savings and environmental benefits. To this end, Enbridge has assessed and evolved its traditional cost-effective

resource acquisition programming and has also added new offers and approaches to further realize energy and bill reductions in addition to the priorities set out in the DSM Framework.

11. Enbridge has responded to the DSM Framework's guiding principles (pages 7 to 9) in the following ways:

<u>Guiding Principle #1:</u> *Invest in DSM where the cost is equal to or lower than capital investments and/or the purchase of natural gas*.

12. The Board has directed that an IRP study be completed to inform the mid-term review. Considerable internal supply-demand coordination and communication has ensued over the last year to support the development of IRP. In addition, Enbridge and Union Gas Limited ("Union Gas") engaged in a half-day discussion and discovery session to consider how to best align methodologies where feasible. This Application filing includes an IRP discussion in Exhibit B, Tab 3, Schedule 3, and a detailed and comprehensive IRP Study outline, at Exhibit C, Tab 1, Schedule 3. Enbridge has also recently completed an Avoided Distribution Cost Study; this study, filed as Exhibit C, Tab 1, Schedule 4, will be used in determining overall avoided costs. Avoided costs are a key element of the Total Resource Cost ("TRC") and Program Administrator Cost ("PAC") tests that will be used during the multi-year period.

<u>Guiding Principle #2:</u> *Achieve all cost-effective DSM that result in a reasonable rate impact.*

13. Enbridge continues to offer its traditional cost-effective programming in the industrial, institutional, and commercial markets through custom and prescriptive offers. In addition, Enbridge's DSM portfolio is moving "down market" to better address the needs of small commercial and industrial customers. It should be recognized that while these customers are cost-effective, they are comparatively

less cost-effective than larger industrial, institutional, and commercial customers given the different barriers that such customers face regarding DSM participation. Enbridge's Multi-Year DSM Plan will also expand operational and behavioural programming. Enbridge is cognizant that the reasonable rate impact of its DSM programs is to be approximately $2.00 per month for a typical residential customer and that the total DSM budget cap is approximately $85 million, inclusive of shareholder incentive, as stated in the DSM Framework.

Guiding Principle #3: *Where appropriate, coordinate and integrate DSM and electricity CDM efforts to achieve efficiencies.*

14. Enbridge has established a solid foundation of relationships by reaching out to various electric utilities and relevant organizations. In many instances, these relationships have been formalized (for example, the Conservation First Advisory Working Group, Conservation First Implementation Committee, etc.). This is in addition to the extensive informal direct dialogue the Company has undertaken with relevant electric Local Distribution Companies ("LDCs"). These efforts hold promise for significantly greater coordination and integration between DSM and electric Conservation Demand Management ("CDM") efforts in the medium to longer term. In the short term, there are significant institutional, administrative, and timing differences that exist. The Company commits to attempting to address these differences as diligently and expeditiously as possible. Further details about past and future collaboration with relevant entities are outlined generally in Exhibit B, Tab 4, Schedule 1 and more specifically in Exhibit B, Tab 4, Schedule 2. In the interim, Enbridge has proposed a Collaboration and Innovation Fund ("CIF" or "Fund"). This Fund will begin in 2015 and carry forward throughout the term of the Multi-Year Plan. The CIF, which is part of the 2015 incremental DSM budget provided for in Section 15.1 of the DSM Framework, will provide the Company with

the flexibility to initiate and follow through on collaborative pilot opportunities. Further detail with respect to the CIF is provided in Exhibit B, Tab 4, Schedule 2.

Guiding Principle #4: *Gas utilities will be able to recover costs and lost revenues from DSM programs.*

15. The Company is supportive of the Board's directive regarding the continuation of the Lost Revenue Adjustment Mechanism ("LRAM") as well as the inclusion in rates of the costs for developing and delivering Enbridge's portfolio of DSM programs. Enbridge was responsive to the Board's DSM Filing Guidelines section 10.0, with respect to avoided costs as it had recently completed a Distribution Avoided Costs Study. The Company will annually update avoided costs, with an eye to considering the Independant Eletricity System Operator ("IESO's") description of avoided electric costs.

> Avoided costs should be based on long-term estimates and include:
>
> - Avoided supply-side and delivery costs, such as capital for distribution infrastructure, operating and commodity costs.
> - Avoided demand-side costs, such as the impact on customer equipment and operating costs.
> - The following avoided upstream costs directly incurred by the natural gas utility: storage costs, transportation tolls and demand charges. [4]

16. Enbridge continues to explore an effective and appropriate pay-for-performance model. It has been participating in discussions with electric utilities and the IESO through the Conservation First Implementation Committee to find a workable solution. The Company will also continue to seek examples in other jurisdictions that are considered successful.

[4] EB-2014-0134, *Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020), December 22, 2014, pg 34.*

Guiding Principle #5*: Design programs so that they achieve high customer participation levels.*

17. Enbridge is supportive of offering programs to a large number of residential and commercial customers and has responded accordingly with its 2016 to 2020 portfolio of DSM offers. For residential customers, Enbridge proposes a rapid expansion and a significant roll out over the 2015 to 2020 period of Home Health Record, a residential behavioural program. The Community Energy Retrofit ("CER") whole-home offering will be expanded franchise wide and will be rebranded as Home Energy Commissioning ("HEC"), reaching tens of thousands of customers. Enbridge has developed a scorecard adapted to ensure that the Company is focused on and generates results through higher participation levels, by separately quantifying results from different customer segments (i.e., Small versus Large Volume Customer CCM metrics). In the commercial and industrial sector, Enbridge has adapted its custom and prescriptive programs to attract the interest of smaller customers. Enbridge has also introduced a Direct Install program and has committed to participate in a number of collaborative direct install pilots through the CIF. These pilots are designed to achieve high participation levels in small commercial and industrial markets.

Guiding Principle #6: *Minimize lost opportunities when implementing energy efficient upgrades.*

18. The new build market is the most effective sector in which to minimize lost opportunities. Enbridge has accordingly expanded its current suite of new construction programs in this Application to include a pilot for small commercial new construction and a new build commissioning offer. Enbridge has also expanded and introduced new elements to its holistic residential offering. Over the past year the Company has developed a new offer for larger, more complex customers: Comprehensive Energy Management ("CEM"). The objective of CEM

is to thoroughly identify all opportunities in a customer's facility so as to minimize lost opportunities. In summary, Enbridge has modified its DSM portfolio and customer incentives to drive deeper and more comprehensive savings when a customer invests in energy efficiency.

Guiding Principal #7*: Ensure Low Income programs are accessible across the Province*

19. Enbridge, through its regular low income stakeholdering process and in response to the DSM Framework, has enhanced the breadth of its offerings in the low income market. In particular, the Company has: i) expanded its private multi-residential low income offering; ii) increased scope to include the promotion of energy efficient design features and construction practices in new affordable housing; iii) worked with various levels of government to leverage existing housing programs and expand its geographic reach; and iv) explored collaboration with electric utilities to expand low income DSM programming within the Company's franchise area and beyond. Enbridge has also taken the important step of creating multi-lingual outreach materials to enhance accessibility for low income customers.

Guiding Principal #8: *Programs should be designed to pursue long term energy savings.*

20. By its very nature, the CCM metric, which is a key metric on the Company's Resource Acquisition scorecard, drives and incents longer term savings. The Company's comprehensive programs, which include HEC and CEM, focus on supporting longer term practices and measures to save energy. As well, new build offers, beyond minimizing lost opportunities, also inherently pursue long term energy savings as building stock typically remains in place for decades.

Guiding Principal #9: *Shareholder incentives will be commensurate with performance and efficient use of funds.*

21. Shareholder incentives are attached to the most promising gas savings, as well as hard to reach objectives, within Enbridge's scorecards, including CEM, Run-it-Right ("RiR"), and HEC. The targets are challenging, and they are only obtainable if the utility is efficient and focused. Enbridge has proposed highly challenging targets for the Board's consideration based on historic CCM trends, aggressive expansion of the Company's HEC target, and results from Enbridge's DSM Potential Study.

Guiding Principle #10: *Ensure DSM is considered in gas utility infrastructure planning at the regional and local levels.*

22. Even prior to the Board's Decision in respect of the Union Gas and Enbridge Facilities applications,[5] Enbridge had been active on this issue with respect to the Great Toronto Area ("GTA") Project Leave to Construct (EB-2012-0451). More recently, Enbridge has formally explored the integration of demand and supply planning processes as well as other areas that may be impacted when considering infrastructure planning at the regional and local levels. From these discussions, Enbridge has prepared an Integrated Resource Planning ("IRP") study outline, filed at Exhibit C, Tab 1, Schedule 3.

23. In addition to the ten guiding principles noted above, several key priorities outlined in the Ministry of Energy's Long Term Energy Plan ("LTEP") and in the Conservation Directive were also captured in the Framework. Enbridge's response to these priorities follows.

[5] Decision and Order, January 30, 2014, EB-2012-0433 / EB-2013-0074 / EB-2012-0451

Key Priorities

(i) Implement DSM programs that can help reduce and/or defer future infrastructure

24. This key priority is addressed in the response to Guiding Principle #10.

(ii) Development of new and innovation programs, including flexibility to allow for on-bill financing options.

25. The CIF will allow Enbridge to explore innovative technologies and novel market approaches through pilot programs with LDCs, the IESO, and relevant third parties. Preliminary information obtained from early development pilots show promise for those having a financing component. In addition, Enbridge is continuing to explore if and how it might appropriately layer an on-bill financing component to the HEC, Direct Install, and other DSM offers. In January 2015, Enbridge held a discovery session with Environmental Defense (“ED”) and the Toronto Atmospheric Fund (“TAF”) to explore their ideas and experience with financing. The Company will further investigate this topic throughout 2015, as it is a highly specialized area with a number of potential solutions which would benefit from broad and experienced input.

(iii) Increase collaboration and integration of natural gas DSM programs and electricity CDM programs

26. This key priority is addressed in the response to Guiding Principle #3.

(iv) Expand the delivery of Low Income offerings across the Province.

27. This key priority is considered in the response to Guiding Principle #7.

28. The DSM Framework further identifies several additional priorities. These include:

(i) Implement DSM programs that are evidence-based and rely on detailed customer data.

29. Enbridge has been a leader in performance-based programming amongst utilities through its RiR program, launched in 2012. RiR will continue through the course of the 2015–2020 Multi-Year DSM Plan. In addition, new operational and behavioural programs will be introduced, including CEM and My Home Health Record. Enbridge will also be participating in a pilot initiative with EnerLife, Union Gas, several LDCs, and the IESO in a program just recently launched called

Performance Based Conservation Pilot Project. Two notable government initiatives, Natural Resource Canada's Portfolio Manager and the Ministry of Energy's promotion of the Green Button data protocol, are intended to enable customers to receive, understand, and act upon metered or bill usage data. Enbridge is building both of these initiatives, as well as other metering and benchmarking activities (e.g., Energy Compass and partnership initiatives such as Race to Reduce), into its portfolio and long term business practices.

30. Enbridge is highly supportive of DSM programming that is informed by detailed data. Allowing customers the ability to receive, understand, and act upon their usage is important if not central to energy literacy and energy management. However, the Company notes that without interval metering and sub-metering infrastructure, these programs do not provide a "silver bullet" and may even require "interpolated" assumptions to mitigate human factor impacts (i.e., usage differences, work shifts being added or removed, etc.). Stated differently, although it is relatively straightforward to measure the natural gas reductions and bill savings resulting from capital or low cost/no cost upgrades to a facility (i.e., from technology changes to cleaning filters or adjusting controls), when the human factor and consequential operational and behavioural impacts are included, many additional assumptions must be accounted for. Accounting for these impacts will often, if not always involve the use of engineering calculations or assumptions, diluting the intended value of measuring natural gas reductions through meter infrastructure.

(ii) Ensure that programs take a holistic approach and identify and target all energy saving opportunities throughout a customer's home or business

31. This priority is considered in the responses to Guiding Principles #6 and #8. Enbridge notes that in growing its holistic programs, total budgets have increased. Not surprisingly, there is an organic increase in annual budgets over the course of

the 2015–2020 Multi-Year Plan. Programs like HEC and CEM are relatively expensive and are responsible for a considerable portion of the increase in budgets from the $30 million range to the $60-$75 million range.

32. Signals from the market and stakeholders of all types have been plentiful. Those signals, in combination with the direction and priorities identified in the Framework, have informed the key themes shaping Enbridge's Multi-Year DSM Plan for 2015–2020. The Offer Descriptions located at Exhibit B, Tab 2, Schedule 1 sets out in detail how the Company has addressed the important goals and priorities outlined by the Board.

Market Evolution

33. The Ontario marketplace for energy efficiency has evolved since the beginning of the 2012 to 2014 Multi-Year DSM Plan. Enbridge anticipates that the electric utilities' CDM activities will reach a greater level of maturity over the coming years, particularly as funding for energy efficiency increases substantially. Although this should lead to enhanced familiarity with energy efficiency, it could also cause market confusion as commercial and industrial customers in particular will need to navigate the many different programs and delivery approaches available in various Ontario jurisdictions. For Enbridge, this market crowding, combined with its work over the years to raise awareness and reach many of its largest customers, will provide challenges in addition to new opportunities.

34. A key challenge in the coming years will be the ongoing trend in energy efficiency projects; namely that it is becoming incrementally more expensive to achieve fewer savings. Said another way, a key observation over the past many years has been a greater number of projects yielding smaller results per project. This will become an even greater issue as the Company increasingly addresses underserved sectors and those markets where savings are harder to reach and require more

comprehensive approaches. The budgets that Enbridge has developed reflect this trend, in addition to new activities and offers designed to address the Board's guiding principles and key priorities. Enbridge is adapting its portfolio to address market evolution. One example is demonstrated through its Energy Leaders offer, which involves working with "leading edge" customers who are catalysts for the dissemination and facilitation of incremental energy savings among peers and who are viewed as being "ahead of the pack" in terms of their energy efficiency. Enbridge will also continue to work with the IESO and LDCs in developing and incorporating the SaveONEnergy brand. This will ensure that customer messaging is both consistent and comprehensive.

Collaboration, Innovation and Flexibility

35. Ensuring collaboration, innovation, and flexibility is important, and these objectives have been built into Enbridge's Multi-Year DSM Plan. Collaboration, for example, has been discussed under guiding principle #3 above. Innovation and flexibility have also been considered to a certain extent, given the focus of the CIF on exploring new technologies and market approaches. It is, however, important to expand upon the critical need for innovation and flexibility. The best innovation often results from well-researched and designed initiatives. Enbridge submits there should be a discreet budget for pilots and research, which in many instances will involve collaboration with other utilities and organizations. Enbridge is currently involved in numerous dialogues with LDCs with respect to offer design and deployment. Given their importance and potential reach, there is a need for collaborative programs to be thoroughly tested and strengthened before being adopted for province-wide rollout. Many of the electric utilities with program ideas and concepts are proposing business cases for pilots which include a contributing role by Enbridge. These efforts will require time and investment, but are expected to yield results and build strong collaborative relationships over time.

36. As noted earlier, Enbridge is proposing a CIF for every year of the Multi-Year DSM Plan to allow for a meaningful commitment to the development of appropriate pilots and research. The $1 million annual CIF will be reviewed as part of the annual audit of Enbridge's DSM results, and all spending will therefore be transparent to the Board and ratepayers.

Enhancement of Approach to Underserved Markets

37. There are several notable underserved markets to date. This can be due to one or more barriers which prevent customers from taking up a program, or result from the limited attention directed at a particular market segment. Traditionally underserved markets typically include low income households outside of the large urban centres and in privately owned facilities, as well as the small industrial and commercial markets where customers may not prioritize energy efficiency.

38. Low Income programming in the market continues to be an important and evolving aspect of Enbridge's DSM portfolio. Enbridge has worked closely and consistently with stakeholders to ensure its low income offering remains best-in-class. Enbridge has also proactively worked to develop programming for the private multi-residential sector, as well as created multi-lingual materials to enable better communication with customers whose first language is not English.

Multiple Policy Objectives

39. Since its inception, DSM has generated significant bill reductions, environmental benefits, and social assistance. These are key policy objectives of DSM which continue to be relevant under the new DSM Framework and in Enbridge's Multi-Year DSM Plan. The Framework and Enbridge's plan also address other policy objectives such as conservation first, broader customer participation, increased focus on environmental attributes (with the addition of the 15% non-energy benefit

adder to the TRC cost-effectiveness test) and longer lived savings, to name a few. These policy objectives and their prominence in Enbridge's Multi-Year DSM Plan were discussed earlier under the guiding principles portion of this Plan Overview. Enbridge notes that the following Conservation First objectives[6], while intended for electric utilities, provide additional policy context for the gas utilities:

- Empowering LDCs by giving them more autonomy and programming choice for their customers, with streamlined oversight and reduced administrative burdens. This would enable LDCs to focus more fully on innovation and cost-effectiveness, whether by working alone, with private sector partners or with other LDCs.

- Establishing clear accountability and mechanisms for meeting the conservation goals in the updated Long-Term Energy Plan.

- Emphasizing the importance of prudent, efficient and effective conservation expenditures to contribute to the important goal of controlling price increases.

- Investing in conservation initiatives that balance benefits to consumers with benefits to the electricity system, and ensuring a fair allocation of costs in line with benefits.

- Maintaining balance, in provincial planning, among various sectors – residential, commercial, and industrial – while recognizing that the value of conservation investments can be higher in some regions than others, due to local conditions

[6] http://www.energy.gov.on.ca/en/conservation-first/

- Renewing efforts to deepen consumer awareness.
- Enhancing the role of LDCs in the delivery of conservation programming for Aboriginal communities, and particularly for on-reserve First Nations customers.
- Leveraging programs and provincial investments to encourage innovation, such as electricity storage and smart grid technologies.
- Improving conservation program delivery for low-income residential consumers.

Energy Management, Behavioural Programming and Energy Efficiency

40. The use of meter data in DSM programming has been a topic of discussion in many forums. As cited in the Energy Literacy Campaign description found on page 94 of Exhibit B, Tab 2, Schedule 1, Offer Descriptions, allowing customers to understand their actual usage is central to energy literacy. Such information will impact decisions about capital improvements and behavioural changes, which in turn drive energy use and bill reductions. Energy management support and corresponding data inputs are key tenets in the evolution of Enbridge's DSM programs. For example, Enbridge has been working on developing a CEM program since 2013 through dialogue and work with several customers. It has also been engaged in an IESO small-scale CEM program in collaboration with EnerSource and Toronto Hydro. Additionally, Enbridge's RiR program, launched in 2012, is proposed to continue through its Multi-Year DSM Plan.

41. Annual budgets, metrics and targets associated with the DSM portfolio are outlined in Exhibit B, Tab 1, Schedule 3. Other material elements of Enbridge's plan are

outlined briefly below and discussed in more detail in the Offer Descriptions, provided in Exhibit B, Tab 2, Schedule 1.

Residential

42. Enbridge is proposing a different approach to its current Home Labelling Offer, which it proposes to call the Home Rating Offer, beginning in 2016.

43. The CER Offer, now known as the HEC Offer, has evolved to both increase the number of participants by taking a tiered incentive approach, and to broaden its reach by expanding to Enbridge's entire franchise area. Participant targets have grown from 160 in 2012 to over 12,000 in 2018, demonstrating the evolution of this offer and its projected impact in the market. Given its whole-home nature and high fixed costs this program is an excellent candidate for collaboration with electric utilities. Discussions regarding pilots to this end are presently underway with several electric utilities.

44. After undertaking a residential behavioural pilot with OPower in 2014, under the offer name My Home Health Records, Enbridge anticipates that its Home Health Record Offer will reach a significant number of its customers during the Company's Multi-Year DSM Plan. Information on energy usage and tips for bill reduction provide an ideal tool to reach more customers, drive participation to other Enbridge programs, and increase energy literacy and awareness in Ontario. This program may also present a suitable candidate for collaboration.

Low Income

45. Enbridge is a recognized leader in the field of Low Income energy efficiency and has been particularly effective in building collaborative partnerships in the marketplace with Local electricity Distribution Companies ("LDCs"), municipalities, social housing organizations, non-profit organizations, and service providers.

46. Enbridge's focus on the Low Income sector in this 2015–2020 Plan will continue to be a priority as detailed in the earlier material pertaining to Guiding Principle #7.

Commercial

47. In the Commercial market Enbridge has evolved its approach and reinvigorated the Company's custom and prescriptive portfolio with the creation of new incentive amounts in order to drive greater participation as well as deeper savings. Committing to reaching smaller commercial customers, Enbridge has done two things: i) added in a separate Small Volume Customer CCM metric that creates focus on achieving results from smaller customers; and ii) developed a direct install offer that will mainly drive results to the Small Volume Customer CCM metric, and which addresses the barriers for engaging small commercial customers such as lack of time, energy management knowledge, and resources.

48. Enbridge has also addressed the feedback heard from stakeholders, the market and the Board in their DSM Framework in that there should be offers tailored to those customers that have already undertaken basic upgrades and are looking to reach harder-to-achieve savings. To this end, the Company has developed an Energy Leaders offer which will be available to any commercial or industrial customer deemed as being a leader in energy efficiency commitments and results.

49. The Energy Compass and RiR Offers will continue to be offered and expanded to drive greater behavioural change and energy awareness. In addition, specific offers like the School Energy Competition will focus on a key sector intended to educate and inform the leaders of tomorrow.

Industrial

50. Much like the Commercial sector, Enbridge has reinvigorated its industrial offers by creating new incentive levels and tiers to drive increasingly deep and long lived savings. Small industrial customers, previously not a primary focus of DSM offers, will receive a new focus with greater results. As the adage goes, "we treasure what we measure," and adding in a Small Volume Customer CCM metric to the Company's scorecard will ensure this important market segment is well served.

Market Transformation and Energy Management

51. Enbridge remains committed to Market Transformation, specifically in relation to the residential and commercial new construction markets and the promotion of home energy ratings. New to Enbridge's DSM portfolio in 2016 is an expanded focus on Energy Management through operational improvements and behavioural changes. Enbridge believes that it's My Home Health Record ("MHHR"), School Energy Competition, Run it Right ("RiR") and Comprehensive Energy Management ("CEM") offers incorporate significant transformational elements.

52. Specifically, the Board has indicated that Market Transformation activities should:

> …focus on influencing consumer behaviour and attitudes that support reduction in natural gas consumption.[7]

The Board goes on to state that:

> Some programs are a mix of market transformation and resource acquisition and seek both outcomes – fundamental changes in markets and direct, measurable energy savings.[8]

On this basis the Company finds it appropriate to group like offers within its new Market Transformation and Energy Management ("MTEM") Program.

53. The direction, content, and scope of Enbridge's MTEM Program are informed by the following guiding principles and key priorities identified in the Board's DSM Framework:

(a) Design programs so that they achieve high customer participation levels;

(b) Minimize lost opportunities when implementing energy efficient upgrades;

(c) Development of new and innovative programs;

(d) Implement DSM programs that are evidence-based and rely on detailed customer data;

(e) Ensure that programs take a holistic-approach and identify and target all energy saving opportunities throughout a customer's home or business;

<u>Other Priorities</u>

54. A number of other priority areas are covered in Enbridge's Multi-Year DSM Plan, including:

[7] EB-2014-0134 "Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020), December. 22, 2014, p.13
[8] Ibid p.14

(a) Green Button

(b) On-Bill Financing / Financing

(c) IRP

(d) Avoided Costs

(e) Potential Study

(f) Carbon Policy

(g) Collaboration and Innovation Fund

(h) Retrospective Stakeholdering (activities undertaken to inform the multi-year plan)

(i) Prospective Stakeholdering (all future stakeholdering activity)

Evaluation and Stakeholdering

55. Enbridge has included its Evaluation Plan and corresponding Offer Evaluation Plans at Exhibit B, Tab 2, Schedule 2. The Evaluation Plans are guided by the OPA EM&V protocols as well as the Company's past experience in the tracking, monitoring and evaluation of program results since 1995.

56. Enbridge will await guidance from the Board on evaluation and audit processes, but in the meantime it will continue until the end of Q2 with key evaluation studies including the current net-to-gross study, and the new boiler base case study through the Technical Evaluation Committee.

57. Enbridge continues to support a Board coordination (or membership) role in the evaluation and audit processes, but sees utility and stakeholder input as helping to achieve optimal solutions and outcomes. To this end, Enbridge suggests a number of principles for consideration in all stakeholdering processes moving forward:

(a) Transparency and openness;

(b) For evaluation work, a heavy weighting on members with objective evaluation expertise, but inclusive of an intervenor(s), the gas utilities, and Board staff;

(c) For audit work, continuing on with the currently productive process of an Audit Committee comprising intervenors and the Company, but with inclusion of a Board Staff member;

(d) For program design, including a broader range of stakeholders in discussions to promote a more inclusive and continuously improving dialogue, leading ultimately to improved results;

(e) Including Board Staff as an active member and/or coordinator on various committees and during stakeholder engagement activities;

(f) Scaling the level of stakeholder engagement and Board oversight activities relative to the risks and rate/customer impacts. Stated differently, the resources and level of effort that is invested should differ according to the nature and potential impact of an issue;

(g) Being cognizant of the concerns and investment of time of parties to help foster constructive working relationships, groups and committees;

(h) Be accommodating so as to allow differences to be communicated; and

(i) Be consensus oriented by striving for mutual wins or productive compromises. While achieving a consensus is a goal, it may not always be possible. In such a case, the Company, as the entity ultimately accountable for its DSM activities, must have the ability to determine that sufficient effort has been employed attempting to reach a consensus and that further efforts are not likely to produce results.

58. In Summary, Enbridge's Multi-Year DSM plan meets the Board's key priorities and guiding principles. The budgets and targets proposed are within the direction provided by the Board in the Framework and, most importantly, this Multi-Year DSM Plan introduces new programs and offers that will significantly enhance DSM activity and results for the Province. As a result of new initiatives and greater focus on previously underserved markets, Enbridge aims to dramatically improve energy literacy for its customers. In Enbridge's' view, the rate impacts are modest, while the potential reductions in customer energy costs, environmental performance, and societal benefits are great.

59. Enbridge values and appreciates the critical role it plays in advancing energy efficiency in Ontario. The following Multi-Year DSM Plan represents a culmination of Enbridge's accumulated expertise in program design and delivery over two decades. The Multi-Year DSM Plan provides thoughtful solutions to complex challenges that arise on our collective journey to a more energy efficient Ontario.

Witnesses: M. Lister
F. Oliver-Glasford

2015 DSM TRANSITION YEAR PLAN

Introduction

1. On December 22, 2014, the Ontario Energy Board (the "Board") released its EB-2014-0134, *Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020)* ("DSM Framework") and *Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020)* (" DSM Filing Guidelines"). Section 15.1 of the DSM Framework set out the Board's direction regarding activities in 2015, calling for 2014 DSM activities to be rolled forward into 2015 in order to facilitate a measured evolution into the new Demand Side Management ("DSM") Framework. Section 15.1 has been included here in its entirety for convenience:

> 15.1 DSM Activities in 2015
>
> The gas utilities should roll-forward their 2014 DSM plans, including all programs and parameters (i.e., budget, targets, incentive structure) into 2015. Both Enbridge and Union requested that their 2014 activities be rolled-forward into 2015 to help facilitate a smooth evolution into the new DSM framework.
>
> The Board agrees this is appropriate and will allow the gas utilities to fully consider the new DSM framework and appropriately develop their DSM portfolios and suite of programs that will make up their new multi-year plans. The gas utilities should increase their budgets, targets and shareholder incentive amounts in the same manner as they have done throughout the current DSM framework (i.e., 2013 updates to 2014 should now apply as 2014 updates to 2015). The Board expects the gas utilities' new multiyear DSM plans will fully address the guiding principles and key priorities outlined in the framework.
>
> Currently, DSM amounts have already been approved and are included in rates for both Enbridge and Union[25]. If necessary, the gas utilities may modify their current suite of programs and re-allocate funds between approved programs up to a maximum of 30% of the approved annual DSM budget for an individual DSM program. Additionally, the gas utilities may increase overall spending by up to 15%, consistent with the Board's guidance as part of the gas utilities' current, approved DSM plans, and use these additional funds to begin to incorporate and address the guiding principles and key priorities outlined in the DSM framework.

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

If a gas utility incurs DSM spending greater than that which has been previously approved, it should track these expenditures in the DSM variance account for clearance in a future proceeding.

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[25] 2015 DSM amounts were approved by the Board as part of EGD's 2014-2018 Custom IR Rate Application (EB2012-0459). EGD has subsequently updated its 2015 DSM budget amounts as part of its 2015 rate application (EB2014-0276). 2015 DSM amounts were approved by the Board as part of Union's 2014-2018 rate application, EB2013-0202. Union has subsequently updated its 2015 DSM budget amounts as part of its 2015 rate application (EB-2014-0271).

2. Enbridge Gas Distribution Inc. ("Enbridge" or the "Company") appreciates the Board's leadership in establishing 2015 as a transition year and agrees that rolling the 2014 portfolio of DSM programs forward into 2015 is appropriate. Enbridge's 2015 DSM Transition Year Plan will roll forward a suite of programs that is essentially unchanged from those offered in 2014, as directed.

3. With the DSM Framework being issued only a little more than one week prior to the commencement of the 2015 year, it was recognized that appropriate transitional provisions were required to provide the certainty that the gas utilities required in order to be able to effectively operate DSM programs in 2015. With the DSM Framework requiring the utilities to file their multi-year DSM applications by April 1st, it is extremely unlikely that a decision can be received from the Board following a joint hearing of the applications filed any sooner than August or September. It would not have been practical nor appropriate from the perspective of rate payers and the utilities that important determinations in respect of budgets and targets for 2015 be delayed until the conclusion of this multi-year DSM application. Rather than require the utilities to operate their DSM programs in a climate of uncertainty until a decision is issued in this proceeding, the Board ordered a rollover of the 2014 budgets and targets. It also required the utilities to

increase the budgets and targets for 2015 in the same manner in which budgets and targets were increased for the 2013 and 2014 years. It would have been extremely prejudicial to Enbridge had it been required to operate its programs in 2015 without having certainty around the DSM budget and targets upon which the shareholder incentive is ultimately based.

4. Enbridge is cognizant of the fact that several of its targets might have otherwise been the subject of review and adjustment had there been sufficient time to proceed with a full and complete hearing into Enbridge's DSM plans for 2015. For example, some parties may have submitted that particular targets and budgets should be raised in light of past successes, while the Company may have taken the position for lower targets and budgets where success has not been produced. In the end, historical incentive results have been produced by overachievement in certain areas, tempered by underachievement in other areas despite best efforts.

5. Further, unless all of the program offers and all of the targets and their metrics are fully considered, and adjusted, then Enbridge submits it is inappropriate to only adjust several. While Enbridge did work extensively with intervenors with a view to attempting to reach an agreement for the purposes of proposing a budget and targets which are more reflective of historical achievements, there was simply insufficient time to complete discussions. It should be recognized that Enbridge and intervenors spent a significant amount of time working towards this end. Nearly a dozen sessions were held including several plenary sessions and several subgroup sessions. The Company provided a substantial amount of information in respect of its program offers and historical results. The Company has, therefore, proceeded with its portfolio of DSM program offers relying upon the transitional provisions set out in section 15.1 of the DSM Framework. This Exhibit confirms

that Enbridge has rolled over its 2014 programs into 2015 and set its budget and targets for 2015 in accordance with the DSM Framework.

2015 Rollover

6. Enbridge's 2015 DSM budget under the 2015 Rollover is based upon the Board's direction in Section 15.1 of the DSM Framework which provides that for 2015, the Company is to generate a budget "in the same manner as they have done throughout the current DSM Framework (i.e., 2013 updates to 2014 should now apply as 2014 updates to 2015)." For the purposes of the Update which the Company filed with the Board for the years 2013 and 2014 (EB-2012-0394) and which was the subject of a complete settlement and acceptance by the Board, a 2% GDP-IPI figure was used to update the budget in both years. Accordingly, the Company has updated its 2014 budget by the same 2%[1] consistent with Section 15.1 of the DSM Framework. This 2% change results in an increase of the 2014 DSM budget of $32.16 million to a budget of $32.80 million for 2015. Section 15.1 of the DSM Framework also calls on the utilities to increase their shareholder incentives in the same manner as was done for 2013 and 2014. As a result, Enbridge has increased its maximum 2014 shareholder incentive of $10.87 million to a maximum 2015 shareholder incentive of $11.09 million. Table 1 on the following page provides an overview of the 2015 Rollover budget and distribution of the maximum shareholder incentive.

7. While it may appear to some that the 2015 scorecards tend to underweight the Community Energy Retrofit ("CER") offer given the level of effort, spending and success associated with this offer in 2014, the targets also include an overweighting on Enbridge's commercial and industrial Cumulative Cubic Meter

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[1] EB-2012-0394, Exhibit B, Tab 2, Schedule 9, page 8

("CCM") target, despite the Company's best efforts which resulted in underachievement. Enbridge submits that it would be both inconsistent with the transition provisions of the DSM Framework and prejudicial to it if, at this late stage, any of the 2014 targets which have been rolled over are now adjusted. Any appropriate adjustments and material changes to programs, targets, and metrics should take place in 2016 having been subjected to a complete review and hearing before the Board.

Table 1: 2015 Budget and Maximum Shareholder Incentive

Program	Program Budget	Overheads	Total Budget	% of Total	Maximum Incentive Available
Low Income	$6,864,090	$517,988	$7,382,078	23%	$2,495,721
Market Transformation	$4,890,900	$1,353,687	$6,244,587	19%	$2,111,159
Resource Acquisition	$14,443,790	$4,731,485	$19,175,275	58%	$6,482,744
Total Rollover Budget	$26,198,780	$6,603,160	$32,801,939	100 %	$11,089,624
		Incremental Budget	*$4,920,291*		
		Total 2015 DSM Budget	**$37,722,230**		

8. In 2015, Enbridge's DSM portfolio will continue with the key features of the 2012 to 2014 DSM Plan as outlined in EB-2012-0394, Exhibit B, Tab 1, Schedule 3, paragraph 3.

9. The following sections address the budgets, scorecards, and key terms relevant to each Program in the 2015 Rollover.

Resource Acquisition Program

10. Table 2 below provides Enbridge's 2015 Resource Acquisition program budget under the 2015 Rollover.

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Table 2: Resource Acquisition Program Budget

Resource Acquisition	Program Costs (millions)
Residential	$1.873
Commercial	$8.252
Industrial	$4.319
TOTAL	$14.444

11. Table 3 below provides Enbridge's 2015 Resource Acquisition scorecard.

Table 3: Resource Acquisition Scorecard

Component	Metric	Weight	Lower	Middle	Upper
Volumes	Lifetime cubic meters (Mm^3)	92%	758.9	1,011.9	1,264.9
Residential Deep Savings	Number of participants[1]	8%	571	762	952

1. Number of participants with at least 2 major measures (average annual gas savings across all participants must be at least 25% of combined baseline space heating and water heating usage for any incentives to be earned)

12. The terms noted in EB-2012-0394, Exhibit B, Tab 1, Schedule 3, paragraph 6 relate to the Company's 2014 Resource Acquisition program offers. These terms continue to apply to the program offers in 2015 subject to updates where appropriate.

13. For clarity, Enbridge confirms that the 2015 total budget spent on programs and activities (including allocated overheads but excluding Low Income Allocations) for all customers in rate classes 110, 115 and 170 shall not exceed the following annual limits:

Rate Class	2015 Spending Limits
110	$1.721 million

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

115	$1.333 million
170	$2.264 million

(a) Enbridge confirms that the above figures were derived by applying the spending limits established for 2014 and increasing them by 2%.

(b) Enbridge further confirms that the purpose of these limits is to ensure that the maximum cost to be borne by industrial customers in these rate classes is known in advance and capped. These limits apply whether or not Enbridge has accessed the DSMVA. Further, they have no bearing on either Enbridge's ability to access the DSMVA (i.e., when it has achieved pre-audit performance equal to the middle band target on a weighted scorecard basis (i.e., the 100% level)) or the calculation of the maximum amount of DSMVA funds which the Company can access and spend on Resource Acquisition efforts (i.e., 15% of the total budget for a Resource Acquisition scorecard). To ensure that commercial customers in the three affected rate classes are not adversely affected by the spending caps, Enbridge commits to managing spending within each of the three rate classes such that no commercial customer in any of the classes would be prevented from participating in any of the Company's DSM program offers as a result of the annual spending caps imposed on each rate class.

Low Income Program Type

14. Table 4 below provides Enbridge's 2015 Low Income program budget under the 2015 Rollover.

Table 4: Low Income Program Budget

Low Income	Program Costs (millions)
Part 9 Single Family	$4.656
Part 3 Single Family	$2.208
TOTAL	$6.864

15. Table 5 below provides Enbridge's 2015 Low Income Scorecard.

Table 5: Low Income Scorecard

Metric: Cumulative Savings (million m³)	Weight	Lower Band	Middle Band	Upper Band
Single Family Ontario Building Code (Part 9)	50%	18.1	24.1	30.2
Multi-residential Ontario Building Code (Part 3)	45%	51.6	68.7	86.0
% of Part 3 Participants Enrolled[1]	5%	30%	40%	50%

1. Low Income Building Performance Management (LIBPM) Percentage of Part 3 buildings enrolled in current year program = (x+y)/(x+y+z) where:
x = # of new LIBPM buildings in the current year which have participated in another aspect of the Low Income program in a previous year of 2012-2014 plan; y = # of new LIBPM buildings participating in current year which have not previously participated in the Low Income program; z = # of buildings in the current year which have implemented custom projects other than LIBPM.

16. The terms found in EB-2012-0394, Exhibit B, Tab 1, Schedule 3, paragraph 8 relate to the Company's 2014 Low Income Program. Subject to any necessary updates the terms provided on the following page will continue to apply in 2015.

(a) Multi-residential social housing, assisted housing, and private rental buildings are eligible for equipment, retrofit, in-suite measures, and program support services such as resident engagement and benchmarking programs. Enbridge and the Low Income Consultative sub-group have worked collaboratively throughout 2013 and 2014, with additional resources as necessary, to develop protocols to include privately-owned multi-residential buildings in the Low Income program within the City of Toronto based on available data specific to this Municipality. Enbridge will work with the Low Income Consultative sub-group to develop protocols for additional Municipalities based on the data and information available in those areas on a case-by-case basis. The protocols for participation of privately-owned low income multi-family buildings in the Low Income program will be based on the following principles:

(i) Eligibility: To be eligible to participate in the Low Income program, it should be established that privately owned multi-residential buildings have a high proportion of low income tenants.

(ii) Screening for eligibility: Will be based on the data available within a given region in consultation with the Low Income Consultation sub-group.

(iii) Impact on Rents: Participation of privately owned multi-residential buildings through building owner or management participation should not result in a rent increase to building tenants.

(iv) Benefits to Tenants: Participation of multi-residential privately owned buildings in the Low Income program should include measures that will result in direct benefit to tenants, e.g., in suite measures that increase comfort and health.

Market Transformation Program

17. Table 6 below provides Enbridge's 2015 Market Transformation program budget.

Table 6: Market Transformation Program Budget

Market Transformation	Program Costs (millions)
SBD Residential	$2.494
SBD Commercial	$0.969
Home Labelling	$1.428
TOTAL	**$4.891**

18. The following sections present the scorecards and terms for each individual Market Transformation offer: Residential Savings by Design, Commercial Savings by Design, and Home Labelling.

Residential Savings by Design

19. Table 7 below provides Enbridge's 2015 Residential Savings by Design scorecard.

Table 7: Residential Savings by Design Scorecard

Metric	Weight	Lower Band	Middle Band	Upper Band
Builders Enrolled	60%	13	18	22
Completed Units	40%	833	1,111	1,389

20. The terms set out in EB-2012-0394, Exhibit B, Tab 1, Schedule 3, paragraph 11 relate to the Company's 2014 Market Transformation program. These terms will continue to apply in 2015 subject to updating where appropriate.

21. Enbridge does propose a modification of one term which relates to the Residential Savings by Design offer. This change is simply a reflection of factual realities and is necessary and appropriate to ensure the continued success of the offer.

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

22. The original definition of "Builders Enrolled" required that Enbridge enroll builders that were within the top 80 largest home builders in its franchise area, as judged by number of home completions. As noted in the Auditor's Report filed in Enbridge's 2013 DSM Clearance of Accounts Application (EB-2014-0277, Exhibit B, Tab 2, Schedule 1), Enbridge was unable to obtain a definitive list of the top 80 builders, despite a good faith effort to obtain this data. The Auditor, Optimal Energy ("Optimal") specifically stated:

> Typically, home builders are reluctant to reveal data about their businesses due to the highly competitive nature of this business. Enbridge did have each enrolled builder self-certify that it had built a minimum of 50 homes in 2012 [i.e. the previous calendar year]. This was the minimum requirement for builders to be eligible to participate in the program per the OEB filed definition for this metric. In addition, Enbridge reviewed various Ontario housing data. This review indicated that a builder who built 50 homes per year would be considered a top builder in Enbridge's service territory. Optimal concluded that this was a reasonable approach."[2]

23. Given that Enbridge's 2013 Auditor, Optimal, found the above-noted approach to be reasonable and that the Board subsequently found this evidence to be sufficient to approve Enbridge's shareholder incentive for the 2013 DSM program year[3], the Company submits that the top 80 requirement should not apply to its Residential Savings by Design "Builders Enrolled" metric. Rather, the threshold for builder eligibility should be confirmation from a builder that it constructed 50 homes in the prior year.

[2] EB-2014-0277, Optimal Energy, Independent Audit of Enbridge Gas Distribution 2013 DSM Program Results, Final Report, June 24, 2014, p. 35 of 63
[3] EB-2014-0277, Decision and Order, February 26, 2015

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Commercial Savings by Design

24. Table 8 below provides Enbridge's 2015 Commercial Savings by Design scorecard.

Table 8: Commercial Savings by Design Scorecard

Metric	Weight	Lower Band	Middle Band	Upper Band
New Developments Enrolled	100%	11	18	24

25. The terms included in EB-2012-0394, Exhibit B, Tab 1, Schedule 3, paragraph 13 relate to the 2014 Commercial Savings by Design offer. These terms will continue to apply to this offer in 2015.

Home Labelling

26. Table 9 below provides Enbridge's 2015 Home Labelling scorecard.

Table 9: Home Labelling Scorecard

Metric	Weight	Lower Band	Middle Band	Upper Band
Realtor Commitments	50%	N/A	Commitment from realtors collectively responsible for more than 5,000 home listings / year	Commitment from realtors collectively responsible for more than 10,000 home listings / year
Ratings performed by buyers and/or sellers	50%	2,250	4,500	6,750

27. The terms noted in EB-2012-0394, Exhibit B, Tab 1, Schedule 3, paragraph 15relate to the Company's 2014 Home Labelling offer. These terms will continue to apply in 2015.

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

2015 Incremental Budget

28. The Board states in the DSM Framework at Section 15.1 that the gas utilities may increase overall spending by up to 15%, consistent with the Board's guidance as part of the gas utilities' current, approved DSM plans, and use these additional funds to begin to incorporate and address the guiding principles and key priorities outlined in the DSM Framework. Enbridge is therefore proposing to spend $4.92 million in 2015 in pursuit of the Board's guiding principles and key priorities as is contemplated by Section 15.1 of the DSM Framework. This figure represents 15% of the rollover budget of $32.80 millon.

29. Table 10 provided on the following pages, outlines a series of studies and initiatives which Enbridge proposes to undertake and finance using the Incremental Budget. For each item, the Company has included a brief description, an estimated cost, and a list of the guiding principles and key priorities which the study, program or initiative addresses.

Table 10: 2015 Incremental Budget

Budget Item	Estimated Cost	Description	Guiding Principle / Key Priority

My Home Health Record Residential Behaviour Program (Opower)	$2,650,000	Rollout of the MHHR offer to residential customers in the first partial year of the offer.	*"Design programs so they achieve high participation levels."* p.8 DSM Framework *"Provide a greater level of customer-specific educational information…"* p.5 DSM Filing Guidelines *"Benchmark energy usage…and compare usage with other similar customers..."* p.6 DSM Filing Guidelines
Integrated Resource Planning ("IRP") Study	$300,000	Undertaking of the Board's guidance to conduct an IRP study. This study is to be completed in time to inform the mid-term review.	*"Implement DSM programs that can help reduce and/or defer future infrastructure investments;"* p.26 DSM Framework *"The Board expects the gas utilities to consider the role of DSM in reducing and/or deferring future infrastructure investments…the gas utilities should each conduct a study, completed as soon as possible..."* p.36 DSM Framework *"Ensure DSM is considered in gas utility infrastructure planning at the regional and local levels."* p.9 DSM Framework
<u>Budget Item</u>	Estimated <u>Cost</u>	<u>Description</u>	<u>Guiding Principle / Key Priority</u>

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Potential Study Update	$50,000	Work towards completing an update to recent Potential Study in order to account for and incorporate more recent market potential data that becomes available. And/or contribute towards funding ground up research in collaboration with Union Gas Limited and the Independent System Electricity System operator (“IESO”) to better inform a sector by sector understanding.	*"The mid-term review will be informed by a study of achievable potential for natural gas efficiency in Ontario to be completed by June 1, 2016. More details on the scope, timing and nature of the mid-term review will be provided at a later date."* p.4 DSM Framework *"Increase collaboration and integration of natural gas DSM programs and electricity CDM programs;"* p.26 DSM Framework *"Development of new and innovative programs…" p.26 DSM Framework*
Green Button Initiative	$300,000	Participate in the Green Button initiative sponsored by the Ministry of Energy. This will include development of a customer information system(s) to allow for data transfer.	*"Provide a greater level of customer-specific educational information…"* p.5 DSM Filing Guidelines *"Benchmark energy usage…and compare usage with other similar customers..."* p.6 DSM Filing Guidelines *"Design programs so they achieve high participation levels." p.8 DSM Framework*

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Budget Item	Estimated Cost	Description	Guiding Principle / Key Priority
Comprehensive Energy Management	$370,000	Offer Comprehensive Energy Management to large industrial and commercial customers.	*"Implement DSM programs that are evidence-based and rely on detailed customer data;"* p.26 DSM Framework *"Ensure that programs take a holistic-approach and identify and target all energy saving opportunities throughout a customer's home or business."* p.26 DSM Framework
Low Income New Construction	$250,000	Initiate Low Income New Construction offer.	*"Minimize lost opportunities…"* p.8 DSM Framework *"Capture potential lost opportunities for energy savings, including new construction of low-income/ affordable housing."* p.10 DSM Filing Guidelines *"Ensure low-income programs are accessible across the province."* p. 8 DSM Framework
Collaboration and Innovation Fund	$1,000,000	Fund for collaborative pilot programs to drive understanding on innovative technologies and market approaches.	*"Increase collaboration and integration of natural gas DSM programs and electricity CDM programs;"* p.26 DSM Framework *"Development of new and innovative programs…"* p.26 DSM Framework
Total	$4,920,000		

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

30. While Enbridge has included budget estimates for each of the incremental budget items, the Company seeks the flexibility to be able to move funds between individual budget items within the total cap of $4.92 million.

31. Incremental Budget items are based on best available information to date. By way of example, based on meetings with Ministry of Energy staff, Enbridge believes that the Provincial government has a strong interest in the gas utilities implementing the Green Button initiative. This initiative and its details are relatively new to Enbridge, and the Company does not feel it could confidently forecast a firm estimate of costs, timing or scope at this time. Despite this, Enbridge is confident that undertaking the project is in line with government expectations, and the Company is prepared to take the necessary steps to proceed in 2015.

32. Similarly, Enbridge is in discussions with a number of Local Distribution Companies ("LDCs") regarding the coordination and integration of electricity CDM with DSM. In a number of instances, these conversations are leading toward the implementation of pilots - as per the CDM program development processes - as opposed to immediate and complete collaboration for an entire program. Enbridge is supportive of this approach as it will allow all parties to carefully consider the appropriate fashion in which to coordinate and integrate these services which function under very different institutional regimes. However, pilots may well end up being characterized by comparatively high costs for comparatively low verified results. The Company cannot commit to these collaborative endeavors using its existing DSM budget, which is already constrained. At the same time, not all conversations with LDCs are mature enough to provide a line-by-line forecast of pilots which will begin in 2015. Further, the pilot program has not yet necessarily been approved by the IESO for deployment, giving rise to further uncertainty.

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

33. Enbridge recognizes and accepts that there must be accountability for the manner in which the 2015 incremental budget is spent. Accordingly, the Company proposes the following commitments:

(a) Enbridge will cap the total amount spent on the incremental budget at $4.92 million, being 15% of the Rollover budget as contemplated by the 2015 transitional provisions of the DSM Framework;

(b) Enbridge will not count any savings generated from the budget items listed within the incremental budget towards its 2015 targets. On this basis, there will be no modification to the 2015 targets to account for the incremental budget items;

(c) Enbridge will track any natural gas savings that occur as a result of the 2015 incremental budget items;

(d) The spending of the incremental budget will be cleared with 2015 results and as such, will be subject to the Audit process. Information on the spending of the incremental budget will be provided in the Company's 2015 Annual Report.

(e) Enbridge will not earn an incentive in 2015 on its use of the 2015 incremental budget, regardless of the natural gas savings generated.

Conclusion

34. The Company's 2015 DSM Transition Year Plan has been developed consistent with the transitional provisions set out in the DSM Framework. The Company used the 2014 budget and program targets and escalated these by the rate agreed to by the parties and accepted by the Board for the 2013 and 2014 DSM plan years.

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

The Company's activities in 2015 are based on an expected DSM budget of $32.80 million plus the incremental budget of $4.92 million, which the Company proposes to spend in pursuit of the Board's guiding principles and key priorities. Enbridge has been operating in 2015 under the belief that 2015 targets, as noted in this exhibit, are the targets which the Company is striving to achieve.

BUDGETS, METRICS AND TARGETS

Introduction

1. In this Schedule, Enbridge Gas Distribution Inc. (“Enbridge”) sets out its proposed budgets, targets and metrics that will apply during the term of the 2015 to 2020 Multi-Year DSM Plan.

2015 Transition Year

2. As per section 15.1 of them Ontario Energy Board’s (the “Board”) EB-2014, 0134, *Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020)* (“DSM Framework”), Enbridge shall be treating the 2015 DSM program year as a Transition Year. The budget, metrics and targets applicable to 2015 are available in Exhibit B, Tab 1, Schedule 3.

2016 and Beyond

3. The following sections describe Enbridge’s DSM budgets, budget allocations, metrics and targets for 2016 through 2020. The DSM budgets and targets presented are informed by a wide variety of inputs including, but not limited to:

    - Enbridge’s most recent Potential Study, and related research;
    - Consultation with customers and business partners;
    - Consultation with intervenors;
    - Past results and trends in Enbridge’s level of achievement and cost-effectiveness;
    - The Board’s guiding principles and key priorities as outlined in the DSM Framework;

- The Board's annual DSM budget cap for Enbridge and guidance on appropriate rate impacts for average residential customers; and,

- Enbridge's knowledge of the market and its customer base.

4. Some key features and highlights of Enbridge's DSM portfolio in 2016 and beyond include:

- A more balanced portfolio which values the achievement of all cost-effective DSM as opposed to only those opportunities with the highest levels of cost-effectiveness;

- An aggressive ramp-up of holistic programs which seek to limit lost opportunities, enable deep long-lasting natural gas savings, and identify all natural gas savings opportunities within a customer's home or business;

- A new focus on consumer education and energy literacy, including the empowerment of natural gas users with customer specific data;

- An increased focus on small commercial and industrial customers, inclusive of tailored offerings and mechanisms to incent achievement in this challenging market segment;

- An increased and, in some markets, entirely new emphasis on data-driven offers to enable operational and behavioural natural gas savings;

- A re-invigorated portfolio of new construction offers to avoid lost opportunities;

- A dedicated Collaboration and Innovation Fund to explore and/or implement collaborative and innovative technologies and market approaches; and

- The sustained achievement of highly cost-effective natural gas reductions working with Enbridge's largest commercial and industrial customers.

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

5. Tables 1 through 5 present the DSM budgets and maximum shareholder incentive amounts for 2016 through 2020. Due to the difficulty of forecasting DSM market realities 5 to 6 years in advance, Enbridge considers its 2019 and 2020 budgets and targets to be preliminary. The Company anticipates that these figures will be assessed as part of the mid-term review to consider their appropriateness at that time and to propose changes or alternatives as appears reasonable.

<u>Table 1: 2016 DSM Budget</u>

Program	Program Budget	Overheads	Total Budget	% of Total	Maximum Shareholder Incentive Available
Resource Acquisition	$29,555,657	$5,076,336	$34,631,993	58%	$6,028,149
Low Income	$10,151,789	$1,743,622	$11,895,411	20%	$2,070,551
Market Transformation and Energy Management	$11,528,281	$1,980,042	$13,508,323	23%	$2,351,299
TOTAL	$51,235,727	$8,800,000	$60,035,727	100%	$10,450,000
		Process and Program Evaluation	*$1,500,000*		
		Collaboration and Innovation	*$1,000,000*		
		DSM IT Chargeback	*$1,000,000*		
		Total 2016 DSM Budget	**$63,535,727**		

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Table 2: 2017 DSM Budget

Program	Program Budget	Overheads	Total Budget	% of Total	Maximum Shareholder Incentive Available
Resource Acquisition	$34,917,980	$5,183,539	$40,101,520	58%	$6,018,665
Low Income	$10,858,121	$1,611,877	$12,469,998	18%	$1,871,569
Market Transformation and Energy Management	$14,850,781	$2,204,584	$17,055,364	24%	$2,559,766
TOTAL	$60,626,882	$9,000,000	$69,626,882	100%	$10,450,000

Process and Program Evaluation	*$ 1,700,000*
Collaboration and Innovation	*$ 1,000,000*
DSM IT Chargeback	*$ 1,000,000*
Energy Literacy	*$ 500,000*
Total 2017 DSM Budget	**$73,826,882**

Table 3: 2018 DSM Budget

Program	Program Budget	Overheads	Total Budget	% of Total	Maximum Shareholder Incentive Available
Resource Acquisition	$39,571,035	$5,479,056	$45,050,090	60%	$6,237,051
Low Income	$11,640,496	$1,611,758	$13,252,254	18%	$1,834,735
Market Transformation and Energy Management	$15,088,600	$2,089,187	$17,177,787	23%	$2,378,214
TOTAL	$66,300,131	$9,180,000	$75,480,131	100%	$10,450,000

Process and Program Evaluation	*$ 1,700,000*
Collaboration and Innovation	*$ 1,000,000*
DSM IT Chargeback	*$ 1,000,000*
Energy Literacy	*$ 500,000*
Total 2018 DSM Budget	**$79,680,131**

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Table 4: 2019 DSM Budget

Program	Program Budget	Overheads	Total Budget	% of Total	Maximum Shareholder Incentive Available
Resource Acquisition	$40,365,109	$5,597,856	$45,962,966	60%	$6,237,461
Low Income	$11,873,306	$1,646,597	$13,519,903	18%	$1,834,735
Market Transformation and Energy Management	$15,387,718	$2,133,977	$17,521,695	23%	$2,377,803
TOTAL	$67,626,133	$9,378,430	$77,004,564	100%	$10,450,000

Process and Program Evaluation	*$ 1,736,746*
Collaboration and Innovation	*$ 1,021,616*
DSM IT Chargeback	*$ 1,000,000*
Energy Literacy	*$ 510,808*
Total 2019 DSM Budget	**$81,273,733**

Table 5: 2020 DSM Budget

Program	Program Budget	Overheads	Total Budget	% of Total	Maximum Shareholder Incentive Available
Resource Acquisition	$41,175,066	$5,719,034	$46,894,100	60%	$6,237,863
Low Income	$12,110,772	$1,682,133	$13,792,905	18%	$1,834,735
Market Transformation and Energy Management	$15,692,818	$2,179,663	$17,872,481	23%	$2,377,401
TOTAL	$68,978,656	$9,580,829	$78,559,485	100%	$10,450,000

Process and Program Evaluation	*$ 1,774,228*
Collaboration and Innovation	*$ 1,043,663*
DSM IT Chargeback	*$ 1,000,000*
Energy Literacy	*$ 521,832*
Total 2020 DSM Budget	**$82,899,208**

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

6. The following sections highlight the key elements of Enbridge's Multi-Year DSM Plan by Program. Additional details regarding Enbridge's Collaboration and Innovation Fund can be found in Exhibit B, Tab 4, Schedule 2, while Enbridge's DSM IT System is discussed in Exhibit B, Tab 4, Schedule 5. A full description of each Program and the offers contained therein can be found in Exhibit B, Tab 2, Schedule 1.

Resource Acquisition Program

7. Enbridge's Resource Acquisition Program will continue to play a dominant role within the Company's DSM portfolio throughout the term of the Multi-Year Plan and will increase in size as a proportion of the overall DSM budget.

8. This ramp-up in Resource Acquisition activity is first and foremost in response to the Board's guiding principle that the new DSM Framework should achieve all cost-effective DSM that results in a reasonable rate impact. This principle, echoing the Minister's Directive of March 31, 2014[1], clarifies that, within reason, the utilities should not limit their DSM activities only to those opportunities which are the most cost-effective. Rather, the utilities should strive to capture all cost-effective opportunities to reduce natural gas use through DSM provided that the rate impact of such activities, particularly to non-participants, is not undue.

9. In addition to the above noted direction, the significant increases in Enbridge's Resource Acquisition budgets in 2016 and beyond are informed by the following guiding principles and key priorities, as outlined by the Board in the 2015 to 2020 DSM Framework:

[1] Minister of Energy, Directive to the Ontario Energy Board, O.C. 467/2014

- Design programs so that they achieve high customer participation levels;
- Minimize lost opportunities when implementing energy efficient upgrades;
- Programs should be designed to pursue long-term energy savings;
- Development of new and innovative programs;
- Ensure that programs take a holistic-approach and identify and target all energy savings opportunities throughout a customer's home or business;
- Include programs that are specifically designed to address customer groups with significant barriers to entry (e.g. small business customers)[2]; and
- Include programs targeted to customers who are already very invested in energy efficiency and where more complex or customer-specific options are necessary.[3]

10. Enbridge believes it is important to maintain flexibility throughout the term of its multi-year DSM plan to introduce and/or discontinue specific offers and initiatives in response to market need and direction. The Company's intended list of Resource Acquisition offers can be grouped and summarized as seen in Table 6 provided on the following page.

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[2] While this was not listed as a specific line item "key priority" identified in the Long Term Energy Plan, Conservation Directive or by the Board on page 26 of the DSM Framework, the Board specifically calls upon utilities on page 27 of the same section to include this item in their DSM Plans.
[3] Same comment as above

Table 6: 2016 to 2020 Resource Acquisition Offers

Offer		Description
Commercial / Industrial:		
Custom Industrial	Evolved	Financial incentives and technical assistance for customized natural gas reduction projects
Custom Commercial	Evolved	Financial incentives and technical assistance for customized natural gas reduction projects
Commercial & Industrial Direct Install Offer	New	Financial incentives for a set list of natural gas reducing measures, covering 50-100% of total project costs. Enbridge can facilitate 'turnkey' installation (i.e. provide a contractor) if desired
Commercial & Industrial Prescriptive (Fixed) Incentive Offer	Evolved	Financial incentives for a set list of natural gas reducing measures, typically with pre-determined incentive amounts and estimated savings
Energy Leaders Initiative	New	Increased incentives and specialized program elements for customers that are already energy efficient
Residential:		
Home Energy Conservation	Evolved	Financial incentives for residential customers targeted at deep savings, installing a minimum number of natural gas reducing measures achieving a minimum savings level. Involves pre and post efficiency audits
Adaptive Thermostats	New	A rebate for residential customers that install an adaptive thermostat as opposed to a traditional thermostat

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

11. Table 7 below provides a breakdown of Enbridge's Resource Acquisition Program budget from 2016 to 2020.

Table 7: 2016 to 2020 Resource Acquisition Budget

Resource Acquisition Program Costs ($ millions)	**2016**	**2017**	**2018**	**2019**	**2020**
Large C/I Customers	$7.60	$7.85	$8.25	$8.42	$8.59
Small C/I Customers	$7.37	$8.52	$9.30	$9.48	$9.67
Home Energy Conservation	$12.15	$15.18	$18.00	$18.36	$18.73
Adaptable Thermostats	$0.88	$1.53	$2.18	$2.22	$2.26
*Run it Right**	$1.51	$1.77	$1.75	$1.79	$1.83
*Comprehensive Energy Management**	$0.05	$0.08	$0.10	$0.10	$0.10
TOTAL Program Budget	**$29.56**	**$34.92**	**$39.57**	**$40.37**	**$41.18**

*RiR and CEM budgets have been allocated between the Resource Acquisition and MTEM budgets

12. Tables 8 through 12 below outline Enbridge's Resource Acquisition scorecards, inclusive of metrics, weighting and targets, for 2016 through 2020. Similar to DSM budgets, Enbridge considers DSM targets for 2019 and 2020 specifically to be preliminary and will be the subject of review in the mid-term review.

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Table 8: 2016 Resource Acquisition Scorecard

Component	Offers Counted	Metric	Weight	Lower	Middle	Upper
Large Volume Customers[1]	Custom, Prescriptive, Direct Install, RiR, CEM	CCM (millions)	40%	453.1	604.2	906.3
Small Volume Customers	Custom, Prescriptive, Direct Install; HEC; Adaptive Thermostats	CCM (millions)	40%	217.6	290.2	435.2
TOTAL RESOURCE ACQUISITION CCM				670.8	894.4	1,341.5
Residential Deep Savings	HEC	Number of participants[2]	20%	5,631	7,508	11,262

1) Large volume consumers include commercial customers with a 3 year average annual consumption of greater than 75,000m^3/year or industrial customers with a 3 year average consumption of greater than 340,000m^3/year

2) Number of participants with at least 2 major measures (average annual gas savings across all participants must be at least 15% of combined baseline space heating and water heating usage for any incentives to be earned)

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Table 9: 2017 Resource Acquisition Scorecard

Component	Offers Counted	Metric	Weight	Lower	Middle	Upper
Large Volume Customers[1]	Custom, Prescriptive, Direct Install, RiR, CEM	CCM (millions)	40%	450.7	600.9	901.3
Small Volume Customers	Custom, Prescriptive, Direct Install; HEC; Adaptive Thermostats	CCM (millions)	40%	273.7	364.9	547.4
TOTAL RESOURCE ACQUISITION CCM				724.3	965.8	1,448.7
Residential Deep Savings	HEC	Number of participants[2]	20%	7,500	10,000	15,000

1) Large volume consumers include commercial customers with a 3 year average annual consumption of greater than 75,000m^3/year or industrial customers with a 3 year average consumption of greater than 340,000m^3/year

2) Number of participants with at least 2 major measures (average annual gas savings across all participants must be at least 15% of combined baseline space heating and water heating usage for any incentives to be earned)

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Table 10: 2018 Resource Acquisition Scorecard

Component	Offers Counted	Metric	Weight	Lower	Middle	Upper
Large Volume Customers[1]	Custom, Prescriptive, Direct Install, RiR, CEM	CCM (millions)	40%	460.6	614.1	921.2
Small Volume Customers	Custom, Prescriptive, Direct Install; HEC; Adaptive Thermostats	CCM (millions)	40%	310.7	414.2	621.3
TOTAL RESOURCE ACQUISITION CCM				771.3	1,028.4	1,542.5
Residential Deep Savings	HEC	Number of participants[2]	20%	9,259	12,346	18,519

1) Large volume consumers include commercial customers with a 3 year average annual consumption of greater than 75,000m^3/year or industrial customers with a 3 year average consumption of greater than 340,000m^3/year

2) Number of participants with at least 2 major measures (average annual gas savings across all participants must be at least 15% of combined baseline space heating and water heating usage for any incentives to be earned)

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Table 11: 2019 Resource Acquisition Scorecard

Component	Offers Counted	Metric	Weight	Lower	Middle	Upper
Large Volume Customers[1]	Custom, Prescriptive, Direct Install, RiR, CEM	CCM (millions)	40%	461.8	615.7	923.6
Small Volume Customers	Custom, Prescriptive, Direct Install; HEC; Adaptive Thermostats	CCM (millions)	40%	322.9	430.5	645.8
TOTAL RESOURCE ACQUISITION CCM				784.7	1,046.2	1,569.4
Residential Deep Savings	HEC	Number of participants[2]	20%	9,711	12,948	19,422

1) Large volume consumers include commercial customers with a 3 year average annual consumption of greater than 75,000m^3/year or industrial customers with a 3 year average consumption of greater than 340,000m^3/year

2) Number of participants with at least 2 major measures (average annual gas savings across all participants must be at least 15% of combined baseline space heating and water heating usage for any incentives to be earned)

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Table 12: 2020 Resource Acquisition Scorecard

Component	Offers Counted	Metric	Weight	Lower	Middle	Upper
Large Volume Customers[1]	Custom, Prescriptive, Direct Install, RiR, CEM	CCM (millions)	40%	463.6	618.1	927.2
Small Volume Customers	Custom, Prescriptive, Direct Install; HEC; Adaptive Thermostats	CCM (millions)	40%	335.1	446.8	670.2
TOTAL RESOURCE ACQUISITION CCM				798.7	1,064.9	1,597.4
Residential Deep Savings	HEC	Number of participants[2]	20%	10,109	13,478	20,218

1) Large volume consumers include commercial customers with a 3 year average annual consumption of greater than 75,000m^3/year or industrial customers with a 3 year average consumption of greater than 340,000m^3/year

2) Number of participants with at least 2 major measures (average annual gas savings across all participants must be at least 15% of combined baseline space heating and water heating usage for any incentives to be earned)

13. As indicated through the weighting of the metrics included in the 2016-2020 Resource Acquisition scorecards, the majority of Enbridge's success in this Program will be judged based on lifetime cubic metres of gas saved (also known as "cumulative cubic metres" or "CCM"). This metric was used extensively in the 2012 to 2014 DSM Plan and continues to be an appropriate measure for success as it inherently incents Enbridge to achieve natural gas savings which are long-lasting, as opposed to those which have short measure lives.

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

14. New to 2016, Enbridge has created two distinct buckets in its Resource Acquisition scorecard for capturing CCM; one for large commercial and industrial customers, and one for small consumers of natural gas, including industrial, commercial and residential customers. This approach has been taken in response to a number of factors which include:

- Past practice of capturing all CCM in a single bucket created a natural tendency for the utility to focus on its largest commercial and industrial customers. A single large project can yield the same outcome as dozens or even hundreds of smaller commercial and residential projects. As a result, this market has been under-served as both cost efficiency and shareholder incentive are maximized through the pursuit of the largest projects.

- The Board's direction to pursue all cost-effective DSM and tailor offers to customers with significant barriers to entry (such as small business customers) indicates that smaller consuming markets should be a priority in Enbridge's 2015 to 2020 DSM Plan, regardless of the fact that they are comparatively less cost-effective than offers directed at large commercial and industrial customers. Providing these markets their own CCM target will cement their importance within the Company's DSM portfolio.

- As a gas utility with a very significant residential customer base, Enbridge believes a robust DSM offer for the residential market is paramount. It does not seem commensurate however, that high levels of effort and spending in this sector should result in a comparatively lower shareholder incentive. Placing greater value on CCM achieved through small consumers will help to maintain focus on this essential market segment.

15. The "Large Volume Customer" CCM target listed in Enbridge's scorecards will count results from Enbridge's Custom, Prescriptive, and Direct Install offers. For the purpose of determining whether a customer's natural gas savings should be captured under this metric, Enbridge will evaluate the customer's

average gas consumption over the past 3 years (or best available equivalent data) to determine whether their average annual consumption is over 75,000m3 for a commercial customer or over 340,000m3 for an industrial customer.

16. It is anticipated that a large proportion of results under the "Large Volume Customer" CCM metric will be achieved through Enbridge's Custom offer, with smaller results achieved through the Prescriptive offer, and limited results from the Company's Direct Install offer. The Direct Install offer has been designed with smaller consumers in mind and will be marketed accordingly. However, in the spirit of achieving all cost-effective DSM Enbridge does not intend to deny large commercial and industrial customer's access to this offer.

17. The "Small Volume Customer" CCM target listed in Enbridge's scorecards will capture results from Enbridge's Custom, Prescriptive, Direct Install, HEC and Adaptive Thermostats offers. For the purpose of establishing whether a commercial or industrial customer's natural gas reductions should be captured under this metric, the Company shall use the same thresholds identified above.

18. In continuation of a successful practice established in 2012 Enbridge has included a metric for "Residential Deep Savings" which focuses on the achievement of 15% gas savings across the offer. In order to be counted as a new participant on Enbridge's scorecard, HEC participants must implement at least two or more eligible DSM measures, striving to achieve at least 15% gas savings. The usefulness of this approach is two-fold:

- While including HEC amongst the smaller CCM bucket noted above will help to maintain management's focus on the residential sector, Enbridge believes that an added metric will cement attention on a market segment which comprises the vast majority of Enbridge's customers and will account for a significant portion of the DSM budget from 2016 to 2020.

- This metric will ensure that the HEC program remains focused on deep savings and does not begin to lean towards smaller, easier DSM measures which may not be long-lasting.

19. It should be noted in relation to the "Residential Deep Savings" metric that this additional metric does not increase the maximum shareholder incentive which is available to the Company for the Resource Acquisition scorecard. Rather, this metric compliments the CCM metric included on the scorecard to more appropriately measure whether the utility has been successful, thus driving Enbridge toward greater success.

Low Income Program

20. The Low Income Program will continue to be a priority for Enbridge in 2016 and beyond, with a significant budget increase of approximately 48% from 2015 to 2016, and a more modest increase of 7% each year from 2016 to 2018.

21. Enbridge is a recognized leader in the field of Low Income energy efficiency and has been particularly effective in building collaborative partnerships in the marketplace with local electricity distribution companies ("LDCs"), municipalities, social housing organizations, non-profit organizations and service providers.

22. Table 13 below provides an overview of Enbridge's individual Low Income offers in 2016 and beyond.

Table 13: 2016 – 2020 Low Income Offers

Offer		Description
Low Income Multi-Residential – Affordable Housing Program	Evolved	A variety of custom and prescriptive incentives for natural gas saving measures, energy audit incentives, and in-suite direct install activities. This offer address both buildings owned by social housing providers and privately owned buildings which have a high proportion of low income residents
Home Winterproofing Program	Evolved	Assessment and weatherization services (i.e. insulation and air sealing) at no cost to eligible participants. As a health and safety measure, CO2 monitors are provided where one is not present in the home
Low Income New Construction	New	Workshops, modeling tools, design charrettes, efficiency consulting, education materials, and financial incentives for affordable housing new construction developments

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

23. Table 14 below provides a breakdown of Enbridge's Low Income Program budget from 2016 to 2020.

Table 14: 2016-2020 Low Income Budget

Low Income Program Costs ($ Millions)	2016	2017	2018	2019	2020
Single Family (Part 9)	$5.76	$6.24	$6.43	$6.56	$6.69
Multi-Family (Part 3)	$3.28	$3.42	$3.81	$3.89	$3.97
Low Income New Construction	$1.12	$1.20	$1.40	$1.43	$1.46
TOTAL Program Budget	**$10.15**	**$10.86**	**$11.64**	**$11.87**	**$12.11**

24. Tables 15 through 19 below outline Enbridge's Low Income scorecards, inclusive of metrics, weighting and targets, for 2016 through 2020. Similar to DSM budgets, Enbridge considers DSM targets for 2019 and 2020 specifically to be preliminary and will be reconsidered as part of the mid-term review.

Table 15: 2016 Low Income Scorecard

Component	Metric	Weight	Lower Band	Middle Band	Upper Band
Single Family Ontario Building Code (Part 9)	CCM (millions)	45%	21.7	28.9	43.3
Multi-residential Ontario Building Code (Part 3)	CCM (millions)	45%	44.2	59.0	88.5
Low Income New Construction	# of Project Applications	10%	4	5	8

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Table 16: 2017 Low Income Scorecard

Component	Metric	Weight	Lower Band	Middle Band	Upper Band
Single Family Ontario Building Code (Part 9)	CCM (millions)	45%	22.7	30.3	45.5
Multi-residential Ontario Building Code (Part 3)	CCM (millions)	45%	46.5	62.0	92.9
Low Income New Construction	# of Project Applications	10%	6	7	11

Table 17: 2018 Low Income Scorecard

Component	Metric	Weight	Lower Band	Middle Band	Upper Band
Single Family Ontario Building Code (Part 9)	CCM (millions)	45%	22.7	30.3	45.5
Multi-residential Ontario Building Code (Part 3)	CCM (millions)	45%	52.3	69.7	104.5
Low Income New Construction	# of Project Applications	10%	7	9	13

Table 18: 2019 Low Income Scorecard

Component	Metric	Weight	Lower Band	Middle Band	Upper Band
Single Family Ontario Building Code (Part 9)	CCM (millions)	45%	22.5	30.0	45.0
Multi-residential Ontario Building Code (Part 3)	CCM (millions)	45%	53.6	71.5	107.2
Low Income New Construction	# of Project Applications	10%	6	8	12

Table 19: 2020 Low Income Scorecard

Component	Metric	Weight	Lower Band	Middle Band	Upper Band
Single Family Ontario Building Code (Part 9)	CCM (millions)	45%	22.3	29.7	44.6
Multi-residential Ontario Building Code (Part 3)	CCM (millions)	45%	55.0	73.3	110.0
Low Income New Construction	# of Project Applications	10%	4	5	8

25. Similar to Resource Acquisition and in continuation of the 2012 to 2014 scorecards, CCM will continue to be the dominant metric measuring Enbridge's success in the Low Income Program. This metric continues to be an appropriate measure for success as it inherently incents the Company to

achieve natural gas savings which are long-lasting, as opposed to those which have short measure lives.

26. Also consistent with past years, the Company will have separate CCM targets for Single-Family Part 9 results and Multi-Family Part 3 results. As in Resource Acquisition, this will ensure that both market segments receive an appropriate level of focus.

27. It should be noted that the targets assigned to the Multi-Residential Part 3 low income building segment are in the Company's view quite aggressive in comparison to past years' performance[4]. These challenging targets are meant to reflect Enbridge's commitment to expanding its Low Income Multi-Residential offer within the private rental market in buildings with a high proportion of low income consumers.

28. In order to reach this difficult to serve market, Enbridge will require the flexibility to adapt its eligibility criteria for each region into which the offer expands. Screening private rental buildings to determine the proportion of tenants which can be considered low income earners is a challenging undertaking, involving issues of data availability, logistical difficulty and consumer privacy amongst others. Success to date can be in part attributed to an effective partnership with the City of Toronto, which provided the information necessary to develop screening criteria that the Company and members of the Low Income Working Group found to be acceptable. These screening criteria are specific to the City of Toronto and the data that has been made available in this region. As the Company expands to additional

[4] Enbridge's 2013 Low Income Multi-Family results were 27.3 million CCM, relative to a target of 60 million CCM (EB-2014-0277, Exhibit B, Tab 1, Schedule 1, p.59). Preliminary and unaudited 2014 results indicate achievement of 32.9 million CCM relative to a target of 64.2 million CCM.

areas in pursuit of this market segment, region-specific criteria may become necessary based on data availability. Enbridge will seek the advice of the Low Income Working Group in this endeavor, with the intention to achieve consensus.

29. New to the Low Income scorecard is a metric to measure success in the Company's Low Income New Construction offer. This offer will be launched in 2015 through the 2015 Incremental Budget provided for in section 15.1 of the DSM Framework and discussed in Exhibit B, Tab 1, Schedule 3 of this Application. While there will be no specific target or shareholder incentive associated with the start-up of this offer in 2015, the Company's Low Income scorecard in 2016 will include a metric for "Number of Project Applications."

30. The Low Income New Construction offer will be similar to the Company's Savings by Design offer, discussed further in this schedule, in that it shall seek to increase the efficiency of new construction developments to a level that is above current building code. Where the Low Income New Construction offer provides added benefit is in the energy costs that are ultimately borne by low income residents or social housing providers. Builders or developers of affordable housing stand to gain little from increasing building efficiency. By avoiding such costs, builders and developers enjoy initial capital cost savings at the time of construction.

31. This, however, translates into higher ongoing operational energy costs for low income consumers or social housing providers. In this sense the Low Income New Construction offer entails an added societal benefit, above and beyond the Company's Savings by Design offer, by increasing building efficiency and decreasing the ongoing energy costs of low income consumers over the long term.

Market Transformation and Energy Management

32. Enbridge remains committed to Market Transformation, specifically in relation to the residential and commercial new construction markets and the promotion of home energy ratings. New to Enbridge's DSM portfolio in 2016 is an expanded focus on Energy Management through operational improvements and behavioural changes. Enbridge believes that it's My Home Health Record ("MHHR"), School Energy Competition, Run it Right ("RiR") and Comprehensive Energy Management ("CEM") offers incorporate significant elements which are transformational in nature. Specifically, the Board has identified that Market Transformation activities should:

> Focus on influencing consumer behaviour and attitudes that support reduction in natural gas consumption.[5]

The Board further states that:

> Some programs are a mix of market transformation and resource acquisition and seek both outcomes – fundamental changes in markets and direct, measurable energy savings.[6]

On this basis the Company finds it appropriate to group like offers within its new Market Transformation and Energy Management ("MTEM") Program.

33. The direction, content and scope of Enbridge's MTEM Program are informed by the following guiding principles and key priorities identified in the Board's Framework:

- Design programs so that they achieve high customer participation levels;

- Minimize lost opportunities when implementing energy efficient upgrades;

[5] EB-2014-0134 "Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020), Dec. 22nd, 2014, p.13
[6] Ibid p.14

- Development of new and innovative programs;
- Implement DSM programs that are evidence-based and rely on detailed customer data; and
- Ensure that programs take a holistic-approach and identify and target all energy saving opportunities throughout a customer's home or business.

34. Table 20 on the next page provides an overview of Enbridge's individual MTEM offers in 2016 and beyond.

Table 20: 2016 to 2020 MTEM Offers

Offer		Description
My Home Health Record ("MHHR")	New	Home energy consumption reports and a web-portal comparing a residential consumer's natural gas usage over time, benchmarking against like consumers, providing energy saving tips, and cross-marketing other Enbridge DSM offerings.
School's Energy Competition	New	Behavioural / Operational offer targeted at schools which incorporates educational elements, student curriculum content development, behavioural elements, student curriculum content development, an energy management system, and competition amongst schools to reduce energy use.
Run it Right ("RiR")	Evolved	Operational improvement offer targeted towards commercial customers which incorporates an energy assessment, technical and implementation assistance, and performance monitoring.
Comprehensive Energy Management ("CEM")	New	Comprehensive offer for large and complex commercial and industrial customers which seeks to establish visible energy inputs so as to create a corporate culture of sustainability through senior management commitment and identification of all opportunities for gas savings in a customer's facility.
Residential Savings by Design ("SBD")	Evolved	An offer which seeks to enable residential developers to construct projects more efficient than required by building code through an integrated design process and financial incentives.
Commercial SBD	Evolved	An offer which seeks to enable commercial developers to construct projects more efficient than required by building code through an integrated design process and financial incentives.
New Construction Commissioning	New	An offer designed to incent builders to commission their projects to ensure that facilities are operating at maximum efficiency levels.
Home Rating	Evolved	An offer which seeks to achieve voluntary adoption of a home rating system as standard practice in the home resale market, similar to home inspections. Through mass market communication and energy audit incentives, the offer will focus on consumers either considering selling or having recently having just purchased a home.

35. Table 21 on the next page provides a breakdown of Enbridge's MTEM Program budget from 2016 to 2020.

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Table 21: 2016 to 2020 MTEM Budget

MTEM Program Costs ($ millions)	**2016**	**2017**	**2018**	**2019**	**2020**
Home Health Record	$3.91	$6.91	$6.91	$7.06	$7.21
School Energy Competition	$0.30	$0.60	$0.50	$0.51	$0.52
*Run it Right**	$0.30	$0.35	$0.35	$0.36	$0.36
*Comprehensive Energy Management**	$0.46	$0.76	$0.91	$0.92	$0.94
Residential SBD	$3.25	$3.25	$3.25	$3.32	$3.39
Commercial SBD	$1.35	$0.95	$1.08	$1.10	$1.12
New Construction Commissioning	$0.85	$0.93	$1.00	$1.02	$1.04
Home Rating	$1.10	$1.10	$1.10	$1.10	$1.10
TOTAL Program Budget	**$11.53**	**$14.85**	**$15.09**	**$15.39**	**$15.69**

*RiR and CEM budgets have been allocated between the Resource Acquisition and MTEM budgets

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

36. The 2015 to 2020 DSM Framework includes a wide variety of policy objectives such as achieving high participation levels, avoiding lost opportunities, pursuing long-term energy savings, implementing programs which rely on detailed customer data, ensuring that programs are holistic, and making offers available to customers that are already energy efficient. Enbridge's MTEM Program seeks to be responsive to the Board's direction in this regard. The Board has further directed the gas utilities to:

> Incorporate multiple performance metrics using a weighted scorecard approach…the scorecards should also include other performance metrics that will motivate the gas utilities to undertake the appropriate activities.[7]

37. Tables 22 through 26 on the next page outline Enbridge's MTEM scorecards, inclusive of metrics, weighting and targets, for 2016 through 2020. Similar to DSM budgets, Enbridge considers DSM targets for 2019 and 2020 specifically to be preliminary and will be reviewed as part of the mid-term review.

[7] EB-2014-0134 "Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020)" Dec.22nd, 2014, p.12

Table 22: 2016 MTEM Scorecard

Component	Metric	Weight	Lower Band	Middle Band	Upper Band
Home Health Report (“HHR”)	CCM (millions)	5%	14.6	19.5	29.3
School's Energy Competition	School's Enrolled	5%	38	50	75
Run it Right (“RiR”)	Participants	20%	56	75	113
Comprehensive Energy Management (“CEM”)	Participants	20%	5	6	9
Residential Savings by Design	Builder Enrolments	10%	23	30	45
	Homes Built	15%	1,875	2,501	3,751
Commercial Savings by Design	New Developments Enrolled	15%	23	30	45
New Construction Commissioning	Enrollments	5%	15	20	30
Home Rating	Ratings Completed	5%	447	596	894

Table 23: 2017 MTEM Scorecard

Component	Metric	Weight	Lower Band	Middle Band	Upper Band
Home Health Report ("HHR")	CCM (millions)	5%	18.8	25.0	37.5
School's Energy Competition	School's Enrolled	5%	45	60	90
Run it Right ("RiR")	Participants	20%	65	86	129
Comprehensive Energy Management ("CEM")	Participants	20%	7	9	14
Residential Savings by Design	Builder Enrolments	10%	15	20	30
	Homes Built	15%	1,688	2,250	3,375
Commercial Savings by Design	New Developments Enrolled	15%	11	15	23
New Construction Commissioning	Enrollments	5%	20	26	39
Home Rating	Ratings Completed	5%	606	808	1,211

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Table 24: 2018 MTEM Scorecard

Component	Metric	Weight	Lower Band	Middle Band	Upper Band
Home Health Report ("HHR")	CCM (millions)	5%	14.8	19.8	29.7
School's Energy Competition	School's Enrolled	5%	53	70	105
Run it Right ("RiR")	Participants	20%	74	99	149
Comprehensive Energy Management ("CEM")	Participants	20%	8	10	15
Residential Savings by Design	Builder Enrolments	10%	17	22	33
	Homes Built	15%	1,721	2,295	3,443
Commercial Savings by Design	New Developments Enrolled	15%	15	20	30
New Construction Commissioning	Enrollments	5%	21	28	42
Home Rating	Ratings Completed	5%	736	982	1,473

Table 25: 2019 MTEM Scorecard

Component	Metric	Weight	Lower Band	Middle Band	Upper Band
Home Health Report (“HHR”)	CCM (millions)	5%	13.5	18.0	27.0
School's Energy Competition	School's Enrolled	5%	60	80	120
Run it Right (“RiR”)	Participants	20%	86	114	171
Comprehensive Energy Management (“CEM”)	Participants	20%	8	10	15
Residential Savings by Design	Builder Enrolments	10%	17	23	35
	Homes Built	15%	1,756	2,341	3,512
Commercial Savings by Design	New Developments Enrolled	15%	16	21	32
New Construction Commissioning	Enrollments	5%	21	28	42
Home Rating	Ratings Completed	5%	846	1,128	1,691

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

Table 26: 2020 MTEM Scorecard

Component	Metric	Weight	Lower Band	Middle Band	Upper Band
Home Health Report ("HHR")	CCM (millions)	5%	10.7	14.3	21.4
School's Energy Competition	School's Enrolled	5%	68	90	135
Run it Right ("RiR")	Participants	20%	98	131	197
Comprehensive Energy Management ("CEM")	Participants	20%	8	10	15
Residential Savings by Design	Builder Enrolments	10%	19	25	38
	Homes Built	15%	1,791	2,388	3,582
Commercial Savings by Design	New Developments Enrolled	15%	16	21	32
New Construction Commissioning	Enrollments	5%	21	28	42
Home Rating	Ratings Completed	5%	939	1,252	1,878

38. Enbridge's MHHR offer will be measured using CCM. Enbridge believes that assigning a separate CCM target to MHHR will ensure that appropriate focus is applied. This should result in continuous improvement of the offer, and the impact of influencing the behaviour of the mass market within the Company's franchise area will be properly valued.

39. For the purpose of measuring the success of the Company's School Energy Competition, a school will be considered "enrolled" at the time that energy monitoring begins using the Energy Management Information System ("EMIS") provided via the offer. At a high level, monitoring is the third of the four steps which comprise the School Energy Competition.

40. As Enbridge proceeds with the expansion of its RiR Offer and the launch of its CEM Offer the Company finds that CCM alone is not an ideal metric for measuring success. Enbridge's proposal is informed by the following:

- Enbridge's experience to date has indicated that savings from these types of offerings are typically small when compared to savings achieved through capital projects completed by large consumers of natural gas; and

- Given that these programs measure results using metered data, as opposed to engineering calculations, they must incorporate a monitoring period, naturally creating a lag time between effort expended and results counted. Enbridge believes that in order to gain and sustain momentum CEM and RiR warrant "leading" and "lagging" indicators of success.

41. Customers shall be deemed a "participant" in Enbridge's RiR offer for the purpose of the MTEM scorecard once they have entered the monitoring stage of the offer, which is the fourth of four steps inherent to this offer. Given that RiR involves a 12 month monitoring period, the Company believes that this leading metric is an essential component of ensuring that participant enrollment in RiR continues to grow each year even as natural gas reductions are captured from existing participants which have enrolled in past years.

42. Customers shall be deemed a "participant" in Enbridge's CEM offer for the purpose of the MTEM scorecard once they have installed the metering and database infrastructure to allow for the measurement of energy consumed

and the measurement of specific energy usage drivers that have been identified as particularly influential. At this stage of the CEM process both Enbridge and the customer will have invested significant time and resources. On this basis, and similar to RiR, the Company believes a leading metric will be imperative in Enbridge's efforts to continually move forward in enrolling new participants.

43. It is the Company's view that comprehensive, or operational and behavioural-type offers should not discourage customers from undertaking more traditional, retrofit-type projects. Quite the contrary; RiR and CEM should encourage customers to identify all available opportunities, whether they be operational or capital in nature. In recognition of both this philosophy and the technical challenges inherent in separating the natural gas savings of retrofit projects from operational or behavioural improvements, Enbridge intends to capture any CCM savings from RiR and CEM in its Resource Acquisition scorecard alongside its Custom, Prescriptive and Direct Install offers. Nevertheless, Enbridge feels that the effort required on the part of the utility is heaviest at the front end with these offers, given that enrolling and working with customers to identify operational opportunities is the main intent of the offer. Enbridge's concern is that if this effort is not measured, and instead only CCM are valued, then the Company will have a natural incentive to only focus on large, highly cost-effective CCM. Enbridge believes this is not appropriate, especially in light of the direction provided by the Board in the guiding principles and key priorities set out in the DSM Framework.

44. For the purpose of assessing whether a builder is "enrolled" in SBD Residential:

i. The builder must have signed a Memorandum of Understanding ("MOU") containing a commitment to participate in the Residential SBD program for a 3-year period

ii. The builder must have completed a program-approved Integrated Design Process ("IDP"), such as IEA Task 23 or the iiSBE developed IDP tool, including requisite energy modeling for homes the builder plans to construct in a new development. Homes to be completed in 2016 must demonstrate at least 25% total energy savings relative to the 2012 Ontario Building Code. Homes to be completed in 2017 and beyond must demonstrate total energy savings of at least 15% relative to the yet to be developed 2017 Ontario Building Code.

iii. Builders will be permitted to enroll in Enbridge's Residential SBD offer more than once to avoid lost opportunities. In order to increase the scale of energy efficiency amongst participating builders, repeat builders will be offered progressively smaller incentives per home, but shall be permitted to collect these reduced incentives for a larger number of units.

iv. In order for a builder's development to qualify as significant enough in size to participate in Enbridge's SBD Residential offer, the development must include no less than 50 homes.

45. For the purpose of assessing the "homes built" metric for SBD Residential:

i. A home must be completed by a participating builder who has completed the IDP process for the development.

ii. A home which, as constructed, has features consistent with the builder's IDP and that make it 25% more efficient than a new home built to the 2012 Ontario Building Code if constructed in 2016, and 15% more efficient than a new home built to the yet to be completed 2017 Ontario Building Code.

iii. Builders may apply the outcomes of the IDP to additional developments if the outcomes are applicable. The homes built in additional developments may be counted as homes built. However, the maximum number of homes for which a builder may receive incentives shall not increase.

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

iv. All homes constructed to the standard in a builder's development shall count towards the "homes built" metric even if rebates were not paid for all of them. Non-rebated units will be verified by a confirmation letter from the builder acknowledging that the homes were built to the IDP standard. Enbridge rebated units will be verified using the blower door test.

46. For the purpose of assessing the "new developments enrolled" metric for SBD Commercial:

i. Only builders and developers who have "enrolled" in the program and completed the IDP process are eligible to be counted towards the target.

ii. "Enrolment" is defined as a signed MOU with a builder or developer containing a commitment to participate in the Enbridge Commercial Savings by Design offer for a 5-year period which will include undertaking an IDP adhering to an Enbridge approved IDP process (such as IEA Task 23 or the iiSBE developed IDP Tool) which also includes the requisite energy model, demonstrating how to achieve at least 15% total energy savings relative to the yet to be completed 2017 Ontario Building Code. The builder must also commit to constructing buildings or a building to the IDP standard within 5 years.

iii. The metric in the Commercial Savings by Design scorecard is based on the number of projects to which a developer commits, i.e., the same developer with different clients and different kinds of projects may be counted multiple times. A minimum 50,000 square feet requirement applies to each project. A project is defined as either a single building or multiples of the same building by the same company that add up to 50,000 square feet.

47. For the purpose of measuring the success of Enbridge's Home Rating offer, a rating will be deemed "completed" when the home has undergone an energy audit to inform the homeowner of the home's energy rating.

<u>2020 Natural Gas Savings Goal</u>

48. In Section 3.2 of the DSM Framework the Board directed the natural gas utilities to establish long-term natural gas savings goals to be met by

December 31, 2020. Enbridge is highly supportive of the concept of a 2020 natural gas savings goal as a means for communicating the value, importance and success of natural gas DSM in Ontario.

49. At the same time, the Company strongly agrees with the Board's decision that:

> Shareholder incentives will be based on the achievement of the annual scorecard metrics and be rewarded to each gas utility annually.[8] Notwithstanding the value of a directional goal for natural gas savings enabled through DSM, Enbridge believes annual achievement of performance scorecards serves as a more appropriate basis for the reward of shareholder incentives.

50. In response to the Board's direction, Table 27 on the next page displays the total lifetime natural gas reductions, or CCM, that will be achieved through its activities in the 2015 to 2020 DSM Plan. For clarity, the figures represented in Enbridge's 2020 Goal represent the net total lifetime natural gas reductions that will be enabled through the DSM activities that Enbridge undertakes throughout the Multi-Year Plan, as opposed to the total natural gas reductions that will have actually occurred within the calendar years of 2015 to 2020.

[8] EB-2014-0134, Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015 to 2020), December 22, 2014, P.13

Table 27: Enbridge's 2020 Natural Gas Savings Goal

Contributor	CCM
2015 Transition Year*	774,359,281
Large C/I	3,053,046,721
Small C/I	882,516,626
Residential	1,064,112,689
Low Income Multi-Family	335,460,721
Low Income Single Family	149,291,870
MTEM	96,340,435
Total Lifetime Net Natural Gas Savings from 2015 - 2020 DSM Programs (m^3)	**6,355,128,342**

*Based on preliminary and unaudited 2014 results escalated by 2%

51. To establish context and orders of magnitude, a natural gas reduction of almost 6.4 billion cubic metres of natural gas is the equivalent of removing nearly 2.6 million homes from the natural gas system for an entire year.[9] At present, Enbridge has less than 2 million residential customers.

52. The Company's DSM efforts from 2015 to 2020 will be of great assistance to the Province in pursuit of its greenhouse gas emission reduction goals. If translated into carbon emission reductions, the Company's 2020 Natural Gas Savings Goal is the equivalent of reducing carbon emissions by 12 million tonnes[10]. This amount is very significant, being the equivalent of removing nearly 2.4 million cars from Ontario roads for a full year.[11]

[9] Assumes each home uses 2,400m3 per year. This is the typical annual usage Enbridge reports for its Rate 1 residential customers.
[10] Assumes that each m3 of natural gas consumed results in 1.89kg of carbon equivalent emissions.
[11] Assumes that the average automobile emits 5.1 tonnes of carbon equivalent emissions in a given year.

Target Adjustment Factor

53. Moving forward into a new DSM Framework Enbridge finds it appropriate to adopt a target adjustment factor ("TAF") for the purpose of ensuring that targets, and subsequent shareholder incentives, are fair and predictable for both ratepayers and shareholders.

54. Within the Resource Acquisition, Low Income and MTEM scorecards presented in this schedule are targets judged through a metric of CCM. The targets proposed by Enbridge and ultimately approved by the Board are based upon the best information available to all parties at the time of the Board's decision approving the Company's Multi-Year DSM Plan. These input assumptions can change over time as a result of evaluation and audit processes relating to Enbridge's DSM business and other applicable market information.

55. As the Multi-Year DSM Plan progresses, Enbridge shall use the TAF for each CCM metric to determine the final targets which will apply to its results, based on the variance in CCM that is attributed solely to changes in input assumptions. Given that Enbridge's lower and upper targets are the product of mid targets, lower and upper targets shall be adjusted concurrent with mid targets impacted by the TAF.

56. Enbridge's TAF shall be calculated as follows:

$$\textbf{TAF} = \left(\frac{\text{CCM Based on Input Assumptions and Adjustment Factors at Time of Audit} - \text{CCM Based on Input Assumptions and Adjustment Factors at Time of Filing}}{\text{CCM Based on Input Assumptions and Adjustment Factors at Time of Filing}} \right)$$

57. Use of the TAF simply reflects the fact that input assumptions are likely to change during the six years of the 2015 to 2020 Multi-Year DSM Plan. The TAF will allow Enbridge to adjust targets to reflect the updating of input assumptions so that results reflect the best available information at the time.

Witnesses: M. Lister
F. Oliver-Glasford
B. Ott

SENSITIVITY ANALYSIS

Overview

1. On page 12 of the Ontario Energy Board's (the "Board") EB-2014-0134 *Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015 to 2020*) ("DSM Filing Guidelines"), the Board outlined its expectation with respect to a sensitivity analysis to accompany the gas utilities' recommended targets and budgets:

> The Board agrees that DSM sensitivity analysis which shows the relation of various natural gas savings levels at differing budget amounts will be helpful in reviewing and assessing the overall multi-year DSM plans proposed by the gas utilities and expects this information to be included in the multi-year plan.

2. Enbridge Gas Distribution Inc. ("Enbridge" or the "Company") has considered several budget scenarios in this filing by specifically identifying the offers within the Company's DSM portfolio that are scalable according to budget. These variable elements are the areas within Enbridge's DSM portfolio where scaling may be possible and/or appropriate, and tied to scorecard metrics. For example, the Company has identified that the Small Volume Customer lifetime natural gas saving ("cumulative cubic meters" or "CCM") metric for Resource Acquisition – which captures the results of offers such as small commercial direct install and prescriptive measures among others – may be scalable up or down based on total available budget. In the case of Low Income, the entire program is believed to be scalable. This means that Enbridge's three Low Income offers and related metrics can all scale according to budget available, though the correlation between budgets and targets may not be linear. Other metrics and related offers were held constant at their proposed level as scaling of those offers was deemed not

Witnesses: M. Lister
K. Mark
F. Oliver-Glasford
B. Ott

appropriate. For example, given that Enbridge's Energy Leaders offer is new, relatively untested and designed to address a particular target pool of customers, scaling this offer could not be accomplished with an appropriate level of certainty regarding outcomes.

3. In order to deem a given offer as scalable, the Company took into consideration offer design, historical results, market intelligence, emerging trends, and the insights offered by Enbridge's DSM Potential Study. The following offers / metrics are considered to be scalable:

1) Home Energy Conservation
2) Large Volume Customer CCM
3) Small Volume Customer CCM
4) Low Income
    a. Part 3 CCM
    b. Part 9 CCM
    c. Low Income New Construction
5) Residential Savings By Design
6) Commercial Savings By Design
7) My Home Health Record
8) Run It Right
9) Energy Literacy

<u>Scenarios</u>

4. After exploring several possible approaches to conducting the sensitivity analyses, the Company chose a hybrid top-down and bottom up approach. Enbridge considered three alternative budget scenarios for each year from 2016 to 2018,

with the understanding that 2015 would be treated as a Transition Year in which targets and budgets were rolled-forward as per the Board's direction in Section 15.1 of the Boards EB-2014, 0134, *Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020),* ("DSM Framework")

5. The Company analyzed the following three scenarios: a scenario in which spending was 75% of proposed annual budgets ("Scenario 1"); a scenario in which spending was 125% of proposed annual budgets ("Scenario 2"); and a scenario in which spending was 150% of proposed annual budgets ("Scenario 3"). The budget scenarios were selected to give an illustrative band of outcomes for review. For illustration, Table 1 below provides an overview of the annual scenario budgets generated in response to the Board's request for a DSM sensitivity analysis.

Table 1 – 2016 – 2020 Scenario Budgets

Budget ($ millions)	Scenario 1 (75%)	Proposed Budgets	Scenario 2 (125%)	Scenario 3 (150%)
2016	$47.65	**$63.54**	$79.42	$95.30
2017	$55.37	**$73.83**	$92.28	$110.74
2018	$59.76	**$79.68**	$99.60	$119.52
2019		**$81.27**		
2020		**$82.90**		

Witnesses: M. Lister
K. Mark
F. Oliver-Glasford
B. Ott

6. Table 2 below provides a more detailed look at the sensitivity analysis conducted for 2016, demonstrating the impact to Enbridge's Resource Acquisition, Low Income, and Market Transformation and Energy Management ("MTEM") Programs based on budget scenarios of 75%, 100%, 125% and 150%. In addition, the overall impact to cumulative cubic meters ("CCM") of natural gas saved across the portfolio has been included.

Table 2 – 2016 Budget Sensitivity by Program

Budget ($ millions)	Scenario 1 (75%)	2016 Proposed Budget	Scenario 2 (125%)	Scenario 3 (150%)
Resource Acquisition Budget	$20.39	**$29.56**	$38.28	$46.53
Low Income Budget	$7.00	**$10.15**	$13.15	$15.98
MTEM Budget	$7.95	**$11.53**	$14.93	$18.15
Total DSM Budget	$47.65	**$63.54**	$79.42	$95.30
Total CCM	713,097,061	**1,001,743,852**	1,146,213,551	1,175,461,860

Witnesses: M. Lister
K. Mark
F. Oliver-Glasford
B. Ott

7. Table 3 below outlines the allocation of DSM costs amongst rates in 2016 under the various budget scenarios considered.

Table 3 – 2016 Rate Allocation[1]: Sensitivity Analysis

	Scenario 1 (75%)	Proposed Budget	Scenario 2 (125%)	Scenario 3 (150%)
Rate 1	$25,917,093	**$35,502,112**	$44,060,587	$53,101,764
Rate 6	$19,007,210	**$24,479,113**	$30,653,800	$36,531,405
Rate 9	$1,888	**$2,518**	$3,147	$3,777
Rate 110	$871,290	**$1,135,379**	$1,505,890	$1,815,174
Rate 115	$844,917	**$1,101,688**	$1,467,598	$1,770,027
Rate 125	$81,363	**$104,968**	$129,228	$154,190
Rate 135	$207,159	**$270,223**	$360,999	$435,552
Rate 145	$349,428	**$454,977**	$600,023	$722,715
Rate 170	$342,177	**$445,724**	$589,604	$710,449
Rate 200	$24,548	**$32,731**	$40,914	$49,097
Rate 300	$4,721	**$6,294**	$7,868	$9,442
TOTAL	**$47,651,795**	**$63,535,727**	**$79,419,659**	**$95,303,590**

[1] The Rate Allocation is based on the overall DSM budget not including shareholder incentives.

Witnesses: M. Lister
K. Mark
F. Oliver-Glasford
B. Ott

8. Table 4 below demonstrates the impact to Enbridge's Resource Acquisition, Low Income, and MTEM Programs in 2017 based on budget scenarios of 75%, 100%, 125% and 150%. In addition, the overall impact to cumulative cubic meters ("CCM") of natural gas saved across the portfolio has been included.

Table 4 – 2017 Budget Sensitivity Analysis by Program

Budget ($ millions)	Scenario 1 (75%)	2017 Proposed Budget	Scenario 2 (125%)	Scenario 3 (150%)
Resource Acquisition Budget	$24.29	**$34.92**	$45.00	$54.77
Low Income Budget	$7.55	**$10.86**	$13.99	$17.03
MTEM Budget	$10.33	**$14.85**	$19.14	$23.29
Total DSM Budget	$55.37	**$73.83**	$92.28	$110.74
Total CCM	774,854,999	**1,083,061,000**	1,236,165,786	1,264,047,934

Witnesses: M. Lister
K. Mark
F. Oliver-Glasford
B. Ott

9. Table 5 below outlines the allocation of DSM costs amongst all rate classes in 2017 under the various budget scenarios considered.

Table 5 – 2017 Rate Allocation[2]: Sensitivity Analysis

	Scenario 1 (75%)	Proposed Budget	Scenario 2 (125%)	Scenario 3 (150%)
Rate 1	$31,361,249	**$43,570,160**	$54,385,345	$65,795,958
Rate 6	$21,052,301	**$26,435,993**	$32,869,050	$38,895,343
Rate 9	$1,983	**$2,644**	$3,306	$3,967
Rate 110	$945,541	**$1,221,435**	$1,610,516	$1,937,424
Rate 115	$919,290	**$1,187,454**	$1,571,669	$1,891,613
Rate 125	$84,593	**$109,385**	$134,915	$160,859
Rate 135	$225,774	**$291,623**	$386,934	$465,850
Rate 145	$377,935	**$488,248**	$640,582	$770,115
Rate 170	$370,753	**$478,950**	$630,049	$757,711
Rate 200	$25,783	**$34,378**	$42,972	$51,567
Rate 300	$4,958	**$6,611**	$8,264	$9,917
TOTAL	**$55,370,162**	**$73,826,882**	**$92,283,603**	**$110,740,323**

[2] The Rate Allocation is based on the overall DSM budget not including shareholder incentives.

Witnesses: M. Lister
K. Mark
F. Oliver-Glasford
B. Ott

10. Table 6 below demonstrates the impact to Enbridge's Resource Acquisition, Low Income, and MTEM Programs in 2017 based on budget scenarios of 75%, 100%, 125% and 150%. In addition, the overall impact to cumulative cubic meters ("CCM") of natural gas saved across the portfolio has been included.

Table 6 – 2018 Budget Sensitivity Analysis by Program

Budget ($ millions)	Scenario 1 (75%)	2018 Proposed Budget	Scenario 2 (125%)	Scenario 3 (150%)
Resource Acquisition Budget	$27.68	**$39.57**	$50.88	$61.87
Low Income Budget	$8.14	**$11.64**	$14.97	$18.20
MTEM Budget	$10.56	**$15.09**	$19.40	$23.59
Total DSM Budget	$59.76	**$79.68**	$99.60	$119.52
Total CCM	816,915,174	**1,147,902,770**	1,306,957,297	1,331,845,623

Witnesses: M. Lister
K. Mark
F. Oliver-Glasford
B. Ott

11. Table 7 below outlines the allocation of DSM costs amongst all rate classes in 2018 under the various budget scenarios considered.

Table 7 – 2018 Rate Allocation[3]: Sensitivity Analysis

	Scenario 1 (75%)	Proposed Budget	Scenario 2 (125%)	Scenario 3 (150%)
Rate 1	$34,427,818	**$47,713,548**	$59,879,124	$72,495,209
Rate 6	$22,158,856	**$27,893,969**	$34,434,037	$40,692,932
Rate 9	$2,098	**$2,798**	$3,497	$4,197
Rate 110	$1,015,357	**$1,302,300**	$1,692,830	$2,027,544
Rate 115	$988,207	**$1,266,826**	$1,651,599	$1,978,638
Rate 125	$89,214	**$115,444**	$142,433	$169,849
Rate 135	$242,866	**$311,237**	$406,549	$487,128
Rate 145	$405,283	**$520,167**	$673,536	$806,454
Rate 170	$397,872	**$510,473**	$662,349	$793,194
Rate 200	$27,280	**$36,373**	$45,466	$54,560
Rate 300	$5,246	**$6,995**	$8,744	$10,492
TOTAL	**$59,760,098**	**$79,680,131**	**$99,600,163**	**$119,520,196**

12. For the purpose of proposing DSM budgets for 2019 and 2020 respectively, Enbridge has opted to apply a 2% escalation to 2018 budgets in order to establish those for 2019, and repeat this escalation from 2019 to 2020. In the Company's view, appropriate budgets for 2019 and 2020 will ultimately a subject of the mid-term review and will be well informed by DSM activities in the early years of the 2015 to 2020 Multi-Year DSM Plan. For this purpose Enbridge has not provided sensitivity analyses for the final 2 years of its DSM Plan.

[3] The Rate Allocation is based on the overall DSM budget not including shareholder incentives.

Witnesses: M. Lister
K. Mark
F. Oliver-Glasford
B. Ott

DSM DEFERRAL AND VARIANCE ACCOUNTS

1. The Ontario Energy Board's (the "Board") EB-2014-0134, *Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020)* ("DSM Framework") and *Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020*) ("DSM Filing Guidelines") provides that, consistent with past practices, various Demand Side Management ("DSM") variance and deferral accounts will be established and used during the term of the 2015 to 2020 Multi-Year DSM Plan. The Board provides specifically for the following deferral and variance accounts in the Filing Guidelines:

- DSMVA (Section 11.2)
- LRAMVA (Section 11.3)
- DSMIDA (Section 11.4)
- Carbon Dioxide Offset Credit Deferral Account (Section 11.5)

2. Under the new Framework, Enbridge believes that it is appropriate to apply for the establishment of three further deferral / variance accounts to provide an administrative mechanism to deal with the tracking, recording and use of certain funds. The first of the three new accounts which Enbridge proposes be established is the Cost-Efficiency Incentive Deferral Account ("DSMCEIDA"). This account will be used to record, roll forward and access any remaining approved DSM budget from one year into the following year where Enbridge is able to meet its overall annual natural gas savings target. The second of the proposed new accounts is the DSM Participant Incentive Deferral Account ("DSMPIDA") which will be used to record the variance between actual incentive

Witnesses: S. Bertuzzi
M. Lister
S. Moffat
F. Oliver-Glasford
R. Sigurdson

payments made, and the budgeted incentive amounts included within the respective year's DSM budget, to participants enrolled in multi-year programs. Finally, the Company proposes the establishment of a DSM Information Technology Capital Spending Variance Account ("DSMITCSVA") which, beginning in 2016, will record the revenue requirement implications of the Company incurring the capital costs of undertaking the replacement and upgrading to its current DSM IT systems. Each of these proposed new accounts is described in greater detail below.

Cost-Efficiency Incentive Deferral Account

3. At page 24 of the Framework, the Board states:

> Cost-Efficiency Incentive
>
> The Board will also make a cost-efficiency incentive available to the gas utilities. In the event that a gas utility is able to meet its overall annual natural gas savings target, the gas utility may choose to roll-forward and use any remaining approved DSM budget amounts in the following year with no subsequent impact on the approved targets for the following year. The funds carried forward would be in addition to the approved budget level for the following year and enable the gas utility to work towards achieving the following year's annual target with the benefit of incremental funds. This is a significant benefit, as the gas utilities are afforded greater flexibility and resources to achieve established target levels if they can efficiently product results.
>
> The key with a cost-efficiency incentive is to ensure it works in tandem with the performance incentive, as opposed to conflicting with the performance incentive. The main goal of administering and delivering energy efficiency programs is to achieve energy efficiency gains and energy savings in the market place. It is also important to achieve this goal by using the least amount of ratepayer dollars. The Board is of the view that the shareholder incentive should be structured so that the gas utilities' main incentive is related to achieving its annual targets. In the event the gas utility does not achieve its annual target, it is unable to carry forward any unspent DSM budget amounts into the following year. The Board will consider what, if anything, should be done with "unused" funds at the end of 2020.

4. Enbridge believes that it is appropriate to establish a new deferral account to record any amounts which become eligible to roll forward into a future year in accordance with the cost-efficiency incentive. Where the Company has achieved its overall annual natural gas savings target on a pre-audit basis and the Company decides to roll forward any remaining approved DSM budget, it will record this amount in the DSMCEIDA. The Company will then seek Board approval for the amount recorded in the account as part of the annual clearance of DSM accounts application. This approved amount would then be available to the Company to use towards achieving the following year's annual target with the benefit of the additional incremental funds. These incremental funds would, in effect, become part of the approved budget for the following year.

5. Enbridge suggests that a DSMCEIDA be established for each of the years 2015 to 2020. As stated in the Framework, the Board will consider what should be done with any "unused" funds which are recorded in the proposed DSMCEIDA at the end of the Multi-Year Plan, which is presumed to be in or around 2021.

<u>DSM Participant Incentive Deferral Account</u>

6. Enbridge also requests that a DSMPIDA be established for each of the years 2015 through 2020, or one DSMPIDA account updated annually. This deferral account will be used to record the variance in incentive payments earned and paid to DSM participants, versus the budgeted annual amounts. Actual payments below the budgeted amount would be returned to ratepayers, whereas payments in excess of the budgeted amount would be collected from ratepayers.

Witnesses: S. Bertuzzi
M. Lister
S. Moffat
F. Oliver-Glasford
R. Sigurdson

Need for the Deferral Account

7. In the Company's previous Multi-Year DSM Plan filing for 2012 to 2014 (EB-2011-0295), the Board approved a settlement agreement ("Settlement Agreement") which contemplated, as part of the Company's DSM market transformation portfolio in 2012, the roll out of two new Savings by Design ("SBD") offers. These offers were developed to address lost opportunities in the residential and commercial new construction sectors. Both offers focused on working with developers and builders to develop a capability within their companies to design and build advanced energy efficient homes and buildings beyond that required by the Ontario Building Code ("OBC").

8. The goal of the SBD offers is to encourage the construction of residential and commercial units which exceed OBC standards. The objective is also to use the Integrated Design Process ("IDP") to demonstrate to builders the potential for achieving higher levels of energy and environmental performance through the application of alternate design approaches. One of the incentives used to encourage the construction of such new units is the provision of a financial performance incentive to those builders and developers that meet the standards required as outlined in their commitment agreement. It was recognized from the outset that there would necessarily be a lag time between the participation in the IDP and the physical construction of the units, which is a prerequisite to a participant earning the available incentive.

9. Under the 2012 to 2014 Multi-Year DSM Plan, performance incentives were available for residential and commercial builders and developers that participate in the IDP and achieve the required energy efficiency levels for each new unit

constructed, subject to certain limits in the third and fifth years, respectively, following their enrollment. With the SBD offers having only started in 2012, incentive payments in each of 2012, 2013, and 2014 did not pose issues for the Company and were managed with the budgets for these years. The Company, however, currently estimates that as of December 31, 2014, approximately $4.7 million in incentives remains potentially owing to participants that enrolled and participated in the Residential SBD and $2.2 million for the Commercial SBD offers during the years 2012 through 2014, should such participants complete the maximum number of qualifying units in the years 2015 and beyond.

10. Enbridge believes that its estimate as at the end of 2015, of the incentives that may become payable in future years, will be even higher given the continued growth of the SBD offers. A payment of incentive amounts is forecast and included in the budget, for each year, but the actual amount of incentive payout required may be quite different than forecast for two primary reasons. First, as part of the program, builders have up to three years for residential or five years for commercial, to build their projects to be eligible for the incentive. There is no way for Enbridge to know for certain when a builder will actually complete the build within this timeframe, and therefore the budget may be inadequate, or too much. Second, the DSM business in Ontario has always encouraged and rewarded utilities for overachieving the DSM targets and goals. To the extent that the Company may over (or under) achieve its targets, the proposed budget may under (or over) collect relative to the actual incentive payments to which participants are entitled. As a result, Enbridge believes that it is appropriate to make regulatory provision for the fact that monies are included in a current year's budget which may be different from incentive payments actually required.

Witnesses: S. Bertuzzi
M. Lister
S. Moffat
F. Oliver-Glasford
R. Sigurdson

11. Enbridge is proposing as part of its 2015-2020 Multi-Year DSM Plan to continue with its SBD offers. It is also proposing a new Low Income Construction Design offer which will be similar to the SBD offers, but directed at buildings intended to be owned or occupied by low-income individuals and families. There is also the possibility that other offers will be introduced during the 2015 to 2020 Multi-Year DSM Plan that will similarly provide eligibility for financial incentives to participants in years beyond the original year of a participant's enrollment. Accordingly, the Company is proposing that the DSMPIDA be available for any offer where financial incentives are payable beyond the original year of enrollment by the participant.

The Proposal

12. Enbridge proposes that the Board approve the establishment of six DSM deferral accounts, being the DSMPIDA for each of the years 2015 through 2020, or a single account that is updated for each year of the plan. Enbridge proposes that these accounts be established for the purposes of tracking and recording the incentive amounts which the Company actually pays out to participants in Board-approved DSM offers where the budget may differ. This may include either debits or credits to the account in the case that the budget over or under forecasts amounts to be paid out. Enbridge is not proposing to pre-collect the entire amount of incentive payments that will be required as of the beginning of 2015. Currently this includes the residential and commercial SBD offers. Once Board approval is received, the DSMPIDA could be available for use in respect of the new Low Income Construction Design offer, which Enbridge is proposing as part of its 2015 – 2020 Multi-Year DSM Plan.

Witnesses: S. Bertuzzi
M. Lister
S. Moffat
F. Oliver-Glasford
R. Sigurdson

The DSMPIDA Methodology

13. The Company proposes that the DSMPIDA only be available in respect of offers approved by the Board. The Company will also seek approval from the Board for the methodology it will use to track, record, pay and clear to rates. The Company proposes the methodology set out below in respect of the residential and commercial SBD offers.

14. The Company will record in the DSMPIDA, for each of the years 2015 through 2020, the variance in the incentive amounts it actually pays out to program participants (in the year of enrollment, or years following enrollment), and the approved budget for that year. Beginning with the end of 2015, the Company will, at the conclusion of each year, calculate the amount that it actually paid out during the year and compare this to the budget set in rates. If the Company has overpaid eligible incentives relative to the budget, it will collect from ratepayers the difference through the annual clearance of accounts. If the Company has underpaid eligible incentives relative to the budget, it will reimburse ratepayers the difference through the annual clearance of accounts

15. The amount recorded in the DSMPIDA will not include any amounts which the Company may wish to access from the DSMVA in respect of performance in excess of the 100% target. The DSMPIDA will also not affect the methodology nor the eligibility of the Company to claim a DSMIDA.

DSM Information Technology Capital Spending Variance Account

16. The evidence in this Application confirms that the current DSM IT system upon which the tracking, monitoring, evaluation and verification of DSM program offers

and results is dependent is at the end of its useful life and needs to be replaced. The forecast capital cost for this work is approximately $5 million, most of which will be incurred in 2015 and 2016.

17. As it is imperative that the Company ensure that the installation and integration of the replacement system does not negatively impact ongoing DSM activities, the Company is currently preparing a plan which will both provide further details of system requirements and the timing of replacement and integration efforts. Enbridge hopes this plan will be filed during this proceeding. While this plan will contain greater granularity and likely more detailed cost estimates, there will remain some uncertainty as to costs until the preferred application's supplier(s) is selected. The Company has proposed, at Exhibit B, Tab 1, Schedule 2, that its DSM budgets for each of the years 2016 through 2020 include a $1 million annual DSM IT charge back. It is proposed that this amount be embedded in rates for each of these years. In consequence of this, the Company is proposing the establishment of a variance account (the DSMITCSVA) which will record the revenue requirement implications of the capital spending on the replacement of the DSM IT systems. The account would record the depreciation, interest, taxes and return on equity costs based on the actual capital cost of the replacement IT system. These amounts will then be brought forward for review by the Board as part of the annual DSM accounts clearance application, and any variance from the amounts embedded in rates will be cleared through to rates as either a credit or debit.

18. As the replacement of the DSM IT systems is necessitated by the demands and rigours of the Framework and the resulting significant expansion of the

Company’s DSM activities, Enbridge is proposing that the capital costs be recovered during the term of the Multi-Year DSM Plan. In this way, those customers who benefit from the expanded DSM activities will pay for the costs of the replacement IT system. As well, given that the costs relate to the acquisition and integration of new software, recovery over this period is consistent with applicable rates of depreciation for software.

Witnesses: S. Bertuzzi
M. Lister
S. Moffat
F. Oliver-Glasford
R. Sigurdson

2016-2020 OFFER DESCRIPTIONS

1. In the evidence that follows, Enbridge Gas Distribution Inc. ("Enbridge" or "the Company") will present program and offer description information for each of the Programs listed in the Demand Side Management ("DSM") Program Portfolio Table provided further below. There are 22 offers / initiatives, contained within three Programs (Resource Acquisition; Low Income; and Market Transformation and Energy Management).

2. Enbridge's 2016 to 2020 DSM portfolio includes both offers that have existed in the past, which the Company proposes to enhance or improve, and those that are completely new. These new or enhanced offers have been developed based on industry input, stakeholder input, Enbridge's experience, and research from best practices in other jurisdictions. They are responsive to market fundamentals, including opportunities and challenges, and perhaps most importantly, they are directly responsive to the Ontario Energy Board's (the "Board") EB-2014-0134, *Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020)* ("DSM Framework") guiding principles and key priorities.

3. A key element to the success of the Multi-Year DSM Plan will be recognition that the utility is ultimately responsible and accountable for its DSM business, and that a degree of flexibility in implementation of the DSM Plan will be required. On that basis, the provisions set out in Exhibit B, Tab 1, Schedule 4 regarding Program Budgets, Metrics, and Targets must by definition remain rigid throughout the Multi-Year DSM Plan, subject to the mid-term review or

impacts of any other proceeding during that time. In contrast, Enbridge submits that the provisions set forth within this schedule must be flexible within reason, and allow the Company to introduce, change, or discontinue activities or initiatives as is necessary to respond to market conditions and the needs of its customers, within the constraints of the DSM budgets and scorecards approved by the Board and the terms of the Framework and the Board's *EB-2014-0134, Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020) ("DSM Filing Guidelines")*

4. Enbridge is proposing this full suite of program offers that will deliver enhanced energy efficiency, greater energy awareness and literacy, significant improvements to Greenhouse Gas Emissions, and resulting bill reductions for Enbridge's customers.

DSM Program Portfolio		
	Resource Acquisition Program	
1	Custom Industrial	Evolved
2	Custom Commercial	Evolved
3	Commercial & Industrial Direct Install	New
4	Commercial & Industrial Prescriptive (Fixed) Incentive	Evolved
5	Energy Leaders	New
6	Home Energy Conservation	Evolved
7	Residential Adaptive Thermostats	New
8	Small Commercial New Construction	New
	Low Income Program	
9	Low Income Multi-Residential – Affordable Housing	Evolved
10	Home Winterproofing	Evolved
11	Low Income New Construction	New
	Market Transformation & Energy Management Program	
12	Savings by Design – Residential	Evolved
13	Savings by Design – Commercial	Evolved
14	New Construction Commissioning	New
15	My Home Health Record (Opower)	New
16	Home Rating	Evolved
17	Energy Compass	Evolved
18	School Energy Competition	New
19	Run it Right	Evolved
20	Small Commercial & Industrial Behavioural	New
21	Comprehensive Energy Management	New
22	Energy Literacy	New

Witnesses: S. Bertuzzi, P. Goldman, S. Hicks, R. Kennedy, M. Lister, E. Lontoc, D. Naden, F. Oliver-Glasford, J. Paris

Resource Acquisition Program

The table, further below summarizes the offers contained within Enbridge's Resource Acquisition Program including eligibility measures, proposed incentives, technical assistance, training, education and marketing communication activities that are planned to support objectives, and the delivery channels that will be used.

Energy efficiency resource acquisition programs are characterized by verified short-term energy savings met through financial incentives and technical assistance to end-use customers in an existing market system[1&2]. Typically this is done using an approach of identification and replacement of a lower efficiency product with a higher efficiency one.

[1] ACEEE, Schlegel and Prahl. 1994 DSM Resource Acquisition and Market Transformation.
[2] Institute for Industrial Productivity. Taylor, Trombley and Renaud. 2012. Energy Efficiency Resource Acquisition Models in North America.

Resource Acquisition Table

	Eligible Measures	Incentives	Key Elements
Custom Industrial	Industrial process heat Space heating Water heating	\$0.10/ m3 for medium and large industrial custom projects for projected savings Maximum of \$100,000 per project	**Technical Assistance:** ESC's and technical experts to help identify efficiency opportunities **Training/Education:** Technical publications and quarterly updates available to customers at no charge, in-person design workshops **Marketing/Communication**: Website portal, Case studies, Sponsorships, University initiative, Quarterly newsletter
	Eligible Measures	**Incentives**	**Key Elements**
Custom Commercial	Replacement or advancement of existing equipment to higher efficiency	\$/m3 Incentives 0-10% =\$0.10/m3 10-20% =\$0.20/m3 20% and above =\$0.30/m3 Maximum of \$100,000 per project	**Technical Assistance:** HVAC and steam trap audits, site assessments, engineering analysis and savings estimations **Training/Education:** Webinars, case studies, in-person design workshops, Commissioning workshops **Marketing/Communication:** Website portal, sponsor industry initiatives
	Eligible Measures	**Incentives**	**Key Elements**
Commercial & Industrial Direct Install	Air Doors, Pre-Rinse Spray Valves, Infrared Heaters, DCKV	EGD will cover 50% of the cost of installed measures (100% for pre-rinse spray valves)	**Technical Assistance:** Site assessment and measure recommendations **Training Education:** Build awareness of EGD's commercial DSM offers and services **Marketing/Communication:** Case studies, trade magazine advertisements, direct mail

Witnesses: S. Bertuzzi
P. Goldman
S. Hicks
R. Kennedy
M. Lister
E. Lontoc
D. Naden
F. Oliver-Glasford
J. Paris

	Eligible Measures	Incentives	Key Elements
Commercial & Industrial Prescriptive (Fixed) Incentive	Air Doors, Pre-Rinse Spray Valves, Infrared Heaters, DCKV Low-flow showerheads, air door etc.	Multiple fixed incentives depending on measure installed	**Technical Assistance:** Online tools to estimate savings, site assessment and measure recommendations **Training/Education:** Contractors to educate on the benefits of efficient technologies **Marketing/Communication:** Case studies, trade magazine advertisements, sponsor industry partners, direct mail
	Eligible Measures	**Incentives**	**Key Elements**
Energy Leaders	Increased incentives available for participants who achieve deep savings and/or installing emerging technologies	Up to 50% higher than existing offers	**Technical Assistance:** HVAC and steam trap audits, site assessments, engineering analysis and savings estimations **Training/Education:** Webinars, case studies, in-person design workshops, commissioning workshops **Marketing/Communication:** Case studies, trade magazine advertisements, sponsor industry partners, direct mail
	Eligible Measures	**Incentives**	**Key Elements**
Home Energy Conservation	Thermal envelope improvements, water saving devices, high efficiency gas furnaces and water heaters	$1,100 for reaching 15%-49% annual gas savings $1,600 for reaching 50% and above in annual gas savings	**Technical Assistance:** Oversight of audit process as required **Training/Education:** Training of contractors as required, training and education of customers, evaluators **Marketing/Communication:** Mass Communication

Witnesses: S. Bertuzzi, P. Goldman, S. Hicks, R. Kennedy, M. Lister, E. Lontoc, D. Naden, F. Oliver-Glasford, J. Paris

	Eligible Measures	Incentives	Key Elements
Residential Adaptive Thermostats	Adaptive Thermostat	$75 upon proof of purchase and installation	**Technical Assistance:** Oversight of audit process as required **Training/Education:** Training of contractors and education of customers, evaluators **Marketing/Communication:** Mass Communication
	Eligible Measures	**Incentives**	**Key Elements**
Small Commercial New Construction	Incentive available for projects which are at least 5% more efficient than mandated by the OBC	Cost for pre and post energy modelling – $10,000 $1.00/m3 performance incentive	**Technical Assistance:** Installation of specific measures as required **Training/Education:** Energy Modelling plan training **Marketing/Communication:** Promotion directly to builders, energy modelers, architects/engineers, contractors, communication

The following sections describe Enbridge's proposed suite of Resource Acquisition offers for 2016-2020. They include offers designed for the three main market sectors: Residential, Commercial and Industrial, though in many instances Commercial and Industrial are treated as like sectors for the purpose of a given offer. For each offer, the descriptions provide details on the goal, target market, background, barriers, and specific details of the offer presented to the market.

1. Custom Industrial

Goal: Provides engineering technical support, business support services, and financial incentives to help customers meet production, energy efficiency, and budgetary needs.

Target market: Targets industrial customers within the following rate classes: 6, 110, 115, 135, 145, and 170.

Background: The customers most receptive to energy efficiency projects have historically been large users of natural gas, many of whom have a corporate objective to cut energy costs, increase energy efficiency and / or reduce carbon emissions. Analysis of results from previous iterations of the Custom Industrial offer demonstrates that annual gas consumption reductions as a result of large and medium industrial projects, has led to average decreases in facility consumption of approximately 3% and 8% respectively, while small industrial projects reduce approximately 13% of customers' total loads.

Enbridge's industrial customers come from a variety of industries, with no single dominant sector. On this basis, segmentation by sector (e.g., pulp and paper, automotive, etc.) provides limited value from a top-down analytical perspective. Alternate types of segmentation (i.e., customers' load profiles; intended use of natural gas) provide a clearer characterization of Enbridge's customers. Specifically, Industrial customers can be best segmented according to their total annual consumption as follows:

Customer Segment	Annual Consumption (m^3)	% of Total Customers	% of Total Consumption
Large Industrial	≥ 1.5 million	8%	72%
Medium Industrial	340,000 to 1,500,000	20%	19%
Small Industrial	< 340,000	72%	9%

The primary objectives of this offer include:

- Increasing adoption of energy efficiency technologies among all industrial customers;
- Assisting customers in overcoming financial, knowledge and technical barriers to increasing energy efficiency;
- Helping customers by enhancing the return on investment of projects;
- Maximizing the energy savings potential of the industrial sector.

Barriers: The Custom Industrial offer aims to address the following barriers to energy efficiency investment or implementation:

- Knowledge barriers – provide customers with information they need to make informed decisions to identify, quantify, and justify energy efficiency opportunities through technical advice and expertise;
- Technical barriers – help customers by informing them, presenting them with alternatives, and ultimately in selecting the right solution, as well as the methodology to quantify key energy inputs; and,
- Financial barriers – provide customers with incentives to help them improve Return on Investment (“ROI”) for energy efficiency initiatives.

Offer Details: Given the wide variety and uniqueness of industrial customers' business and technical needs, the most appropriate method of addressing customers' energy efficiency goals is often a customized approach.

Key elements of the Custom Industrial offer design include:

- Knowledge Development – Enbridge provides customers with a variety of technical publications and quarterly updates at no charge, in addition to in-person workshops to give customers the information they need to make informed decisions;
- Opportunity Identification – Energy Solutions Consultants ("ESCs") and technical experts provide a variety of services to help our customers identify efficiency opportunities, some of which include plant and equipment testing as well as assessments and thermal imaging;
- Measurement – Enbridge will continue to help customers select the appropriate means of measurement to quantify key energy inputs;
- Engineering Analysis – This valuable analysis serves as the basis for calculating energy losses and comparing various energy efficiency options;
- Implementation Planning – Enbridge will work with customers to develop an implementation plan and connect customers with relevant business partners;
- Financial Incentive – Monetary support serves to offset a portion of the capital costs associated with energy efficiency projects. Enbridge proposes the following incentive structure:
  - For customers with annual consumption > 340,000 m^3:
    - $0.10/ m^3 for industrial custom projects for projected savings;
    - This incentive cannot exceed 50% of the project cost, to a maximum of $100,000 per project; and,

- For customers with annual consumption < 340,000 m^3:
  - 0.30/ m^3 for industrial custom projects for projected savings;
  - This incentive cannot exceed 50% of the project cost, to a maximum of $100,000 per project.

A higher tier for smaller customers makes energy efficiency implementation more attractive to Enbridge's smaller industrial customers, who typically see a benefit to cost ratio that is smaller because of lower net gas savings per project. Enbridge believes it is important to directly engage this important, and to date under-served market, in light of the Board's direction to achieve all cost-effective DSM with a reasonable rate impact.

The Custom Industrial offer is largely predicated on the relationship fostered between Enbridge's ESCs and customers. ESCs are responsible for providing sound technical and business support, in addition to preparing engineering calculations and documenting and maintaining substantiated savings claims and key project information for reporting and evaluation purposes.

2. <u>Custom Commercial</u>

<u>Goal:</u> Provides engineering support, business support services, and financial incentives to help customers meet energy efficiency and budgetary goals.

<u>Target Market:</u> Targets commercial customers in the following rate classes: 6, 110, 115, 135, 145, and 170.

Background: Historically, this offer has had the greatest uptake among larger customers within the commercial sector. The Commercial Custom offer is a significant contributor to the Company's Resource Acquisition target, historically representing over 85% of the Commercial sector's cumulative or lifetime cubic meter reductions ("CCM") since 2008.

Though it is hard to characterize a 'typical custom project', common projects include boiler replacements, heat recovery projects, or building controls. Custom projects can include prescriptive/quasi-prescriptive measures, in cases where both custom and prescriptive measures are being implemented and tracked as part of the Custom Commercial offer. The decision type is either replacement or advancement of existing equipment to a higher efficiency level.

Enbridge supports customers' goals of reducing their natural gas consumption, and thus this offer is available to all commercial customers. The custom incentive is a crucial component that allows the Company to influence project decisions and investments that result in gas savings. Enbridge maintains a neutral stance on the customer's choice of projects and measures, and will provide the custom incentive so long as the resulting natural gas savings can be accurately projected.

Barriers: Several factors can affect a customer's willingness or ability to participate in energy efficiency projects including, but not limited to:

- Lack of funding for capital and operational measures, with a preference given to more attractive electricity savings incentives or other capital needs;

- Uncertainty of savings or a Return on Investment ("ROI") that is below the customer's threshold;
- Lack of time and conflicting priorities;
- Property owned by others (split incentive); and,
- Lack of technical expertise and program awareness.

Offer Details: The Commercial Custom offer provides technical assistance and financial incentives aimed at encouraging existing commercial customers to implement energy efficient technologies. The offer consists of variable incentives based on project specific details wherein custom calculations are used to estimate the savings and the incentive is calculated based on a range of \$0.10-\$0.30/m^3 of gas saved. A central component of the Custom offer is the consultative services that Enbridge provides to customers, assessing building energy consumption, evaluating recommendations by third party service providers, and making recommendations for gas-saving measures, which will ultimately generate an incentive based on the annual gas savings a customer is projected to achieve. Historically, the Commercial Custom offer has included a flat incentive rate of \$0.10/m^3, to a maximum of 50% of the project cost, or \$100,000 per customer per year. Beginning in 2016, Enbridge is proposing an increased, tiered custom incentive structure as described in the table below:

Percentage of annual consumption (m^3) saved	2016 -2020 \$/m^3 Incentive
0-10%	\$0.10/m^3
10-20%	\$0.20/m^3
20% and above	\$0.30/m^3

Enbridge will to continue to use the maximum incentive cap of 50% of the project's capital cost (before tax) or $100,000 per customer per year.

The new tiered incentive structure is intended to drive a greater uptake of projects that yield deep savings. The higher incentives for these projects will encourage the adoption of additional efficiency measures and/or the installation of the most efficient equipment possible to achieve the highest result. From the customer's perspective, a higher incentive helps offset the increased capital requirement that may be associated with deep savings, thereby making the project(s) more attractive.

Enbridge may consider time-limited or enhanced incentives focused on specific opportunities, either technology-based or sector-based, throughout the Multi-Year DSM Plan. Corresponding marketing and outreach efforts are made to support such campaigns. The offer is delivered by ESCs, who work directly with customers, engineering firms, distributors and contractors.

3. <u>Direct Install</u>

<u>Goal:</u> The primary goal of this offer is to more effectively reach the small to mid-size commercial market segment. As identified by the Board, this customer group has historically experienced significant barriers to entry[3], limiting DSM results achieved to date. In addition to commercial customers, Enbridge intends to make its Direct Install offer available to smaller industrial customers where appropriate and in

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[3] EB-2014-0134 "*Report of the Board: Demand Side Management Framework for Natural Gas Distributors*", Dec.22, 2014, p.27

pursuit of all cost-effective DSM, as these customers can in many instances share similarities to commercial customers of this size. The offer, which is applied to specific, specialized technologies, intends to extend the reach of DSM activity beyond straight-forward prescriptive incentives to a point that is not as labour intensive as a full custom retrofit.

Target Market: This offer is intended for smaller commercial and industrial customers in rates 6, 110, 115, 135, or 145, though larger customers are not precluded from participation.

Background: The Direct Install offer will be an important new contributor to the Resource Acquisition Program and a key vehicle in engaging a small and medium sized customer segment that has had little historical participation with DSM programs, and has historically been a hard-to-reach segment. Since 2000, only 4% of all commercial customers have participated in an Enbridge DSM program. However, the cubic meters consumed by these customers represent 37% of the total commercial gas load, indicating that the majority of the customers that have participated are the larger gas consumers.

Through the Direct Install offer, customers will be able to receive new efficient equipment at no cost / low cost which will yield immediate benefits, most notably gas savings and longer equipment life, as well as free consultation regarding their equipment and gas consumption. The offer provides a vehicle for Enbridge to better engage with this customer segment, and build customer rapport and awareness of the Company’s DSM offers and services.

Barriers: The small commercial segment in particular has had little historical participation with commercial DSM. The factors which contribute to this particular market's unique barriers are summarized well through the following quote from a paper prepared for ACEEE by K. Warner of Xenergy:

> The attributes of small commercial customers that lead to low market penetration and participation include:
> - All energy bills as a small portion of total operation costs,
> - rent building space,
> - relatively high turnover rates,
> - focus on revenues and not on costs,
> - lack of information on DSM technologies,
> - high value on time,
> - many competing options for investment finds.
>
> All of these factors leave customers feeling they don't have the time or the interest to learn about measures that will reduce their energy bills.[4]

Offer Details: The Direct Install offer is a "turnkey" solution that makes it easy and affordable for customers to increase their energy efficiency. Enbridge and its selected contractors will assist customers in their decision making processes, beginning with an assessment of the customer's current equipment and concluding with the installation of eligible, efficient equipment within the Direct Install offer. Enbridge will cover 50% of the cost of the equipment and installation for air doors, infrared heaters, and demand control kitchen ventilation and 100% of the cost of pre-rinse spray valves. Going forward, Enbridge may add specific technologies to the Direct Install offer as demand, budget, and technologies permit. In addition, the Company is involved in many discussions looking towards a collaborative, Province

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[4] Delivering DSM to the Small Commercial Market: A Report from the Field on What Works and Why**.**, p. 1, K. Warner

Wide, electric Local Distribution Company ("LDC") Direct Install initiative. The following are brief descriptions of the technologies currently being considered for the Direct Install offer:

- *Air Doors* – Air doors are commonly used on openings to the outdoors or to unheated portions of a building that need to remain open because of high traffic volumes or because of the inconvenience of constant door movement. These are commonly used in warehouses, manufacturing, industrial, or retail buildings with forced air space heating;
- *Pre-Rinse Spray Valves ("PRSV")* – Pre-rinse spray valves are used in commercial and institutional kitchens and are designed to remove food waste from dishes prior to dishwashing. This offer is for full service restaurants that install pre-rinse spray valves that have a flow rate of 0.64 Gallons per minute ("GPM") or less;
- *Infrared Heaters* – An infrared heater transfers higher heat temperatures through electromagnetic radiation, a highly efficient method to heat people and objects directly, creating warmth and comfort at ground level. This offer is best suited to commercial and industrial customers that are replacing Unit Heaters;
- *Demand Control Kitchen Ventilation ("DCKV")* – DCKV may be installed in any kitchen facility requiring cooking ventilation. The primary market sectors include Food Service and Food Sales.

4. Commercial & Industrial Prescriptive (Fixed) Incentive

Goal: The goal of the Prescriptive offer is to reduce natural gas use through the capture of cost effective energy efficiency opportunities in new and existing commercial sector buildings.

Target Market: Though larger customers are not precluded from participation, this offer is targeted to smaller commercial and industrial customers in Rates 6, 110, 115, 135, and 145.

Background: The Prescriptive offer is an important contributor to the Company's Resource Acquisition Program. A range of prescriptive incentives are offered to Enbridge customers to encourage the purchase and installation of energy efficient equipment that will yield natural gas savings. Prescriptive incentives offer advantages to customers, in that customers are able to apply for incentives through a relatively straightforward process requiring proof of purchase and installation and other supporting documents. Since savings and incentives are fixed, the Prescriptive offer is a transactional, cost effective, straightforward and easily verifiable approach that generates savings for Enbridge's customers.

Barriers: Factors that may limit participation in the Prescriptive offer may include:

- Lack of funding for capital and operational measures, with a preference given to more attractive electricity savings incentives or other capital needs;
- Uncertainty of savings or ROI below customer's threshold;
- Lack of time and conflicting priorities;
- Property owned by others (split incentive); and,
- Lack of technical expertise and offer awareness.

Offer Details: The Prescriptive offer method of calculating annual savings is based on substantiation documents that detail pre-set cubic meter savings. The costs of energy efficient upgrades are intended to be offset by energy savings. Examples of prescriptive technologies are low-flow showerheads, air door heat containment systems, ozone laundry, and ENERGY STAR products.

In addition, Enbridge offers quasi-prescriptive incentives for a range of measures where the incentive is determined by a simple calculation based on the equipment installed. Measures include demand control ventilation, infrared heaters, make-up air units, and high efficiency boilers. Quasi-prescriptive incentives are offered and subject to the same process as fixed incentives, retaining all of the advantages that the offer presents to the customer.

In 2016, Enbridge will increase fixed incentives as part of a strategy to target more participation among commercial and industrial customers, specifically smaller customers. It is anticipated that higher incentives, covering a large proportion of the incremental cost of more energy efficient capital equipment, will work to overcome one of the main barriers to adoption in the commercial sector. Higher fixed incentives are necessary in order for the offer to be competitive and relevant to customers, especially in light of low natural gas prices, and the greater incentive levels for electricity conservation offered by LDCs.

5. <u>Energy Leaders</u>

<u>Goal:</u> The goal of the Energy Leaders initiative is to support commercial and industrial customers who have been identified, or are self-identified, as ‘Energy Leaders’. The intention of the initiative will be to review, determine, and incent areas

for incremental energy efficiency activity among these customers who deem themselves energy leaders and who are striving to reach the next level of energy efficiency.

Target market: This offer targets energy leaders in the following rate classes: 6, 110, 115, 135, 145, and 170.

Background: This marketing initiative addresses the recognition that over time, either through an Enbridge program, and/or as a result of separate work on energy conservation, some customers may have already achieved significant energy reductions at their respective facilities. This initiative seeks to accomplish several goals:

- Identify and / or respond to those that are progressive in energy upgrades and practices,
- Understand the facility's current baseline, through the review and audit of actual data and onsite examination; in order to identify new or outstanding energy savings opportunities; and,
- Create exposure for interested energy leaders by highlighting truly progressive energy efficiency, through a case study or other channels.

This initiative helps respond to the Board's directive that the natural gas utilities DSM portfolios should include, "programs targeted to customers who are already very invested in energy efficiency and where more complex or customer-specific options are necessary."[5]

Enbridge has been offering DSM programs to its business market customers since 1995. Over this time frame many of the customers who have participated in the Company's DSM activities have achieved significant reductions in energy consumption. Enbridge believes that further efficiencies for commercial and industrial customers can also be accomplished through operational and behavioural improvements, including commissioning, and continuous monitoring to optimize energy use over time, as well as incentives to implement new, emerging, and cutting edge technologies.

Barriers: Some commercial and industrial customers may in fact be "energy leaders" in their sectors or may perceive themselves to be energy leaders, and feel that Enbridge does not have an offer available in which they can participate.
This initiative will also highlight and incent those participants in the Run it Right ("RiR") and Comprehensive Energy Management ("CEM") offers, further outlined within this schedule, who consistently over the course of the monitoring period show sustained savings levels, and those who engage in new and emerging technologies at the outset of their market adoption progress.

[5] EB 2014-0134 Report of the Board:: Demand Side Management Framework for Natural Gas Distributors, Dec. 22, 2014, p.27

Offer Details: Through offers such as RiR and CEM as well as through working with customers on Custom projects, Enbridge will look to identify customers that can be considered leading in the energy efficiency market in their particular sector. These customers will be offered audits and assessments to identify any opportunities that may remain for energy efficiency upgrades. They will also be offered increased incentives for implementing new and innovative technologies, as well as 'harder to reach', deeper savings.

These increased incentives will be tailored to the specific customers participating in this initiative and be reflective of the savings and or emerging technology being promoted. Where these customers can be considered best in class or industry leading, Enbridge will also investigate a public recognition initiative at the customer or municipality level. A customer will also have the ability to self-nominate, in which case Enbridge will conduct audits, assessments, and benchmarking to establish energy efficiency performance and confirm that the customer is indeed an energy leader. Once a customer has been identified as an energy leader, an ESC will work with the customer to both identify opportunities for enhanced savings and the potential for emerging technological upgrades and the Company will then document, and learn from the best practices of energy leaders.

6. Home Energy Conservation

Goal: The goal of the Home Energy Conservation offer ("HEC") is to promote meaningful improvements to residential customers' gas consumption and thereby help customers lower their energy bills.

Target Market: HEC is targeted to Rate 1 residential customers.

Background: The Home Energy Conservation offer, previously known as the Community Energy Retrofit, was introduced in 2012 as Enbridge began exploring more holistic, multi-measure offers geared towards a 'whole-home' approach. The offer's focus was on driving participants towards deep savings by requiring customers to undertake a minimum of two DSM measures and, at the same time, an average savings across all participants of 25%. Customers participating need to implement at least two qualifying measures, these currently include:

- Heating system replacement
- Water Heating system replacement
- Wall insulation
- Basement insulation
- Attic Insulation
- Air Sealing (minimum reduction of at least 10% as measured by a blower door test)
- Exposed floor insulation
- Drain Water Heat Recovery system
- Windows

The offer was originally modelled after Natural Resource Canada's ("NRCan") ecoEnergy program, which existed from 2007 to 2012. On average, homeowners who participated decreased energy use by 20%. The incentives between federal and provincial funding reached approximately $10,000 per home. In contrast, Enbridge's offer provides a maximum of $2000 per home for gas related measures.

Enbridge has typically targeted this offer to neighbourhoods with the following characteristics:

- Higher than average energy consumption;
- Higher than average household income;
- Dwellings built 16 to 30 years ago;
- Above average proportion of single detached dwellings; and,
- Low participation in NRCan's ecoEnergy program.

Barriers: Some of the specific barriers that customers typically have in relation to home energy retrofits include:

- The cost of many energy retrofit measures requires significant investment on the part of the homeowner. There is also a cost associated with identifying potential measures related to energy efficiency;
- Given the complexity of the various retrofit activities, it can be difficult for customers to prioritize which to undertake. It is often important to focus on key energy related measures and, where possible, to co-ordinate energy retrofit work with other renovation and upgrade projects;
- Locating reliable renovation contractors with knowledge and experience in energy retrofits is an additional challenge; and,

- The return on investment for implementing upgrades to achieve natural gas savings relative to electricity, in addition to the competitiveness of LDC incentives, may impact customer decision making.

Offer Details: The HEC offer is a direct-to-consumer delivered initiative. Enbridge will continue with the offer, requiring installation of two or more eligible measures, striving to achieve at least 15% gas savings.

To be eligible for the offer, customers must meet the following criteria:

- Be a residential homeowner in the EGD franchise area;
- Have a valid Enbridge Gas account in good standing;
- Use an approved Certified Energy Evaluator (“CEE”);
- Install at least two measures; and,
- Complete a pre- and post-energy audit.

Incentives will be directed at covering the cost of the energy audit and providing an incentive based on modelled natural gas savings as a result of measures installed. Beginning in 2016, Enbridge is introducing a tiered incentive structure:

- Up to $500 for full (pre and post) energy audits, not including HST;
- $500 for reaching 15%-25% annual gas savings (incremental to the $500 for energy audit);
- $1,100 for reaching 26%-49% annual gas savings (incremental to the $500 for energy audit); and,
- $1,600 for reaching 50% and above in annual gas savings (incremental to the $500 for energy audit).

An opportunity exists for further expansion of the HEC offer; this will be explored as the offer continues to evolve. That opportunity lies first with those customers who would not currently be eligible for Enbridge's suite of Low Income offers, to those who are just above the low income cut-off. Low Income customers are defined as those households spending 30% or more of their income towards shelter costs. The current qualifications for participation in Low Income Home Winterproofing includes household incomes less than the Low Income Cut-Off ("LICO") plus 35% or those customers that are enrolled in a specified list of social assistance programs. The following table shows the difference between LICO +35% and LICO + 50%.

Household Size	LICO 135% (Household Income)	LICO 150% (Household Income)
1 person	$32,212	$35,792
2 persons	$40,103	$44,559
3 persons	$49,302	$54,780
4 persons	$59,859	$66,510
5 persons	$67,892	$75,435
6 persons	$76,569	$85,077
7 persons or more	$85,248	$94,721

Depending on the size of the home; the dollar value that separates 135% of LICO; the point at which a customer is eligible for the Low Income Program, and 150% of LICO represents approximately $3,500 for a 1 person household up to $9,500 for a 7 person household. This increased income is not likely of significant enough value to encourage a customer to perform any form of energy equipment upgrades. As a result, it may be appropriate to offer an increased incentive through HEC to these "lower" income customers which could enhance the appeal of addressing the home's energy efficiency requirements for this subset of customers.

Another opportunity for the HEC offer is identifying those customers who believe they have addressed all available potential energy efficiency measures in their home. These customers will be difficult to qualify, however are good candidates for increased efficiency education. In addition, a smaller incentive can be offered for incorporating those energy measures on the HEC list of eligible measures that they have not already undertaken.

7. Residential Adaptive Thermostats

Goal: The goal of this offer is to broadly reach the mass market with a straight forward prescriptive offer that can help customers achieve gas savings.

Target Market: The Adaptive Thermostat offer is targeted to Rate 1 residential customers.

Background: Over the past twenty years, the thermostat market has been continually evolving. Traditional manual, non-programmable thermostats have been prevalent in homes for some time, however over the past decade homeowners have been able to choose from a variety of programmable thermostats that have user-driven automated functionality in the form of time specific temperature presets. As smart phones and the internet become increasingly more integrated in how we manage our time and resources, the newest generation of thermostat technologies has arrived. Adaptive thermostats do not passively await input. Rather, they can anticipate needs, patterns, and behaviours, and can be accessible almost anywhere. They can track whether and where customers are in their home, or in their city, and make modifications to ensure they are comfortable when and where needed.

Beyond comfort, these new technologies enable energy savings by either adapting to customer behaviour, or through geo-coded data, identifying when occupants are, or are not home. Adaptive or geo-fencing thermostats typically have the following key features and benefits:

- Ease of creating schedules;
- Intuitive set up, typically using narrative and lifestyle related questions;
- Pro-active or forced automatic energy savings adjustment features;
- Greater control with remote web or app based control;
- Maintenance alerts; and,
- Ongoing “learning” of lifestyle schedules and preferences.

Barriers: Barriers that interrupt customer uptake of adaptive thermostats typically include:

- Cost of the unit – The typical cost of an adaptive thermostat is approximately $250, whereas programmable thermostats range in cost from $50 to $100;
- Unfamiliar technology – Wi-Fi technology adoption has been growing in certain areas, and for certain demographics, but has seen a slower adoption curve in other areas and demographics. More features can be perceived as complicated, rather than ‘better’; and,
- “Big brother” perception – Customers continue to remain cautious around Wi-Fi connected purchases with concerns around personal data ownership and security.

Offer Details: Not all customers are looking to, can afford, or in some cases even need, a complete 'whole-home' energy retrofit. Many of these customers however, could nonetheless benefit from the potential savings that can be generated by installing and using an adaptive thermostat. This offer will address a stand-alone prescriptive opportunity for residential customers. As with past prescriptive offers, the incremental costs for this energy efficient upgrade are intended to be offset by energy savings. Examples of past residential prescriptive technologies are the TAPS, programmable thermostat, and furnace rebate offers.

A rebate will be offered to customers upon qualified / approved installation. Enbridge will also use other offers to create more interest in the Adaptive Thermostat offer (i.e., Home Rating, or Home Energy Conservation). To be eligible, customers will have to meet the following eligibility criteria:

- Residential customer in Enbridge franchise area;
- Valid EGD account number; and,
- Proof of purchase and installation of the unit.

The proposed incentive level is $75, upon proof of purchase and installation. Enbridge has been engaged in discussions with a few LDCs on collaboration around adaptive thermostats, and will continue to explore design and deployment integration.

8. Small Commercial New Construction

Goal: The intention of the Small Commercial New Construction concept is to provide small commercial builders and owners/developers access to cost effective energy modelling alternatives, in addition to facilitated energy efficiency discussions to encourage them to commit to building to a higher level of energy efficiency. This approach will make incentives available to smaller projects, while acknowledging the various interactive relationships between design, technologies, and energy performance. This offer is intended to be a pilot in 2016 with CCM results expected to begin in 2017.

Target Market: The target market for this offer includes builders and designers of new, Part 3 commercial buildings (up to 75,000 sq. ft.) in Enbridge's franchise area. Generally, these buildings will fall within Rate 6.

Background: The Design Assistance Program ("DAP") was developed and offered from 1999 to 2012 to engage the new building design community to design and model new construction buildings to higher levels of energy efficiency beyond the 2006 Ontario Building Code. As technology progressed a more rigorous program was introduced by Enbridge in 2012 called Savings by Design ("SBD"). The SBD offer, which the Company is planning to continue through the 2015-2020 Multi-Year DSM Plan, includes key elements of the Integrated Design Process ("IDP"). The Commercial SBD offer was designed to work with builders and developers at the pre-design phase of a commercial development(s) with aggregate floor space of 100,000 sq. ft. or more. Since 2012, more than 40 projects have benefitted from the IDP process.

Energy modelling is the process of creating a computerized model to estimate a building's annual energy consumption. Energy Modelling can be used to assess the relative energy efficiency of a number of possible design alternatives using parametric runs. Using specialized software, a modeler inputs as much information as possible, both about the building itself (e.g., size, function, type, materials and equipment to be used, etc.) and about the site where the building will be located (e.g., climate data for the area, surrounding landscape, etc.). The software will utilize this information to generate a detailed estimate of how the building will use energy.

Commercial buildings have a large and dramatic impact on the environment. They use or produce roughly:

- 50% of the extracted natural resources and one third of the country's energy use
- 25% of landfill waste
- 10% of airborne particulates
- 35% of greenhouse gases

It is important to note that in 2017 there will be a change implemented to the Ontario Building Code ("OBC"). The expected amendment is anticipated to include an increase to the required energy efficiency of newly constructed buildings of approximately 15% above the OBC of 2012.

Savings by Design is restricted to larger Part 3 new buildings, and in its full design, is not easily transferable in a cost effective manner to smaller new construction projects.

There is an opportunity to reach smaller commercial buildings in Enbridge's franchise area who would otherwise be considered good candidates for the SBD Commercial offer, but do not meet the size requirement for that offer. The Small Commercial New Construction offer would not require the same level of commitment from the builder as is the case for SBD. Enbridge will provide energy model options to different levels above code to enable energy savings.

Barriers: Specific barriers that prevent small commercial new construction builders from seeking to maximize energy efficiency include:

- Increased cost of energy efficiency upgrades in a price driven market – building occupants or downers are not often interested in spending more for a more energy efficient building;
- Smaller building owner/developers are less likely to have the funds, time, inclination, and/or knowledge of energy efficiency and related incentives available in the marketplace; and,
- Trades training to install innovative energy efficiency measures.

Offer Details: The Small Commercial New Construction offer seeks to incorporate a facilitated energy performance modelling process to generate recommended design approaches that focus on energy efficiency, subsequently achieving CCM savings. An example of projects that could benefit from this approach are small office buildings, schools, commercial retail buildings, religious and community hall facilities, long term care, hotels and motels, restaurants, and workshop/storage/ small warehouse buildings.

Financial incentives will be based on whole building energy modelled performance and will cover costs associated with modelling in addition to incentives for achieving specific energy efficiency targets.

The offer will make performance incentives available to small commercial projects by relying on a modelling tool to estimate the savings and incentives for a given project based on project parameters; there are a number of modelling tools available for this task.

The offer design recognizes that in smaller buildings it is often a challenge to achieve significant cost effective energy efficiency performance.[6] As a result, incentives are being made available based on CCM reductions upon submission of the energy model. In order to be eligible for incentives the project must be at least 5% more efficient than mandated by the OBC. The proposed incentives are as follows:

- Cost for pre and post energy model – approximately $10,000; and,
- Builders that complete the modelling and implement the measures are eligible to receive a performance incentive of $\$1.00/m^3$ based on post construction modelled results.

[6] Realizing the Energy Efficiency Potential of Small Buildings, National Trust for Historic Preservation: Preservation Green lab, & New Buildings Institute, June, 2013, p. 47.

Low Income Program

The table further below summarizes Enbridge's Low Income Program, and the offers contained therein, including eligibility measures, proposed incentives, technical assistance, training and education, the marketing communication activities that are planned to support objectives, and the delivery channels that will be used.

Low Income Table

	Eligible Measures	Incentives	Multi-Residential Affordable Housing
Low Income Multi-Residential Affordable Housing	Mixture of fixed, custom and in suite measures	Fixed Incentives, Custom Incentives - 40 cents/m3 saved up to 50% of the cost of the retrofit. Half the cost of energy audit: up to $5,000 per building or $0.01 per m3 of gas consumed	**Technical Assistance:** Building assessments, energy audits **Training/Education:** Resident education and engagement, Building operator and staff training **Marketing/Communication:** Event sponsorships, association/trade/sector publications, offer literature, case studies; public relations
	Eligible Measures	**Incentives**	**Key Elements**

	Eligible Measures	Incentives	Key Elements
Home Winterproofing	Home assessment and weatherization services 'Health and safety' repairs in the home	No Charge home assessment and weatherization Direct install of "basic measures", Health and safety measures as warranted	**Technical Assistance:** Building assessment by a Certified Energy Advisor. **Training/Education:** For social housing projects, tenant energy education to build awareness on energy and promote behavioural changes energy use. Program outreach and training to LEAP intake agencies. **Marketing/Communication:** Association memberships, event sponsorships, advertising association/trade/sector publications, offer literature, case studies, public relations, community outreach events, radio, direct mail

Low Income New Construction	Mechanical and building shell measures that contribute to an increase in the higher efficiency level from current Ontario Building Code.	For Part 3 (Multi-Residential) developments: Tiered financial incentives e.g.; 15%, 20%, 25% above code costs will be $3,000, $10,000; and $25,000 respectively, plus an additional up to $2,500 per unit, to a maximum of $100,000 per building. At building completion, provide a commissioning incentive up to$10,000.	**Technical Assistance:** Enbridge funded workshops, modelling tools and consultants, and charrettes that promote an integrated design process, and energy efficient and green construction practices Access to an energy efficiency/sustainability consultant during the various phases of project construction **Training/Education:** Training and outreach to municipal service managers, Energy education materials for residents **Marketing/Communication:** Association memberships, event sponsorships; advertising association/trade/sector publications; offer literature; case studies; public relations; Community outreach events, radio, direct mail, Street posters in selected low income neighborhoods.

9. Low Income Multi-Residential – Affordable Housing

Goal: This offer aims to reduce the energy consumption of existing Multi-Residential buildings in the affordable housing market.

Target Market: The target market for this offer is social and assisted housing providers who own and operate Part 3 buildings and private multi-residential building owners that provide housing to low income households. In addition, shelters and supportive housing will be targeted.

Background: The social and assisted housing segment represents approximately 12% of the total multi-residential housing sector within the Enbridge franchise area. Additionally, an estimated 8% of commercial private sector multi-residential buildings are occupied by residents that meet low income thresholds. The majority of multi-residential buildings are small to mid-sized buildings consuming less than 300,000 m^3 annually. To date, approximately 42% of social and assisted housing has participated in an Enbridge incentive program.

Utility costs are often among the largest operating cost items for multi-residential buildings. Low income buildings are generally older and in need of building repair or upgrade. The Low Income Multi-Residential Affordable Housing offer is marketed to social and assisted housing providers and owners of income qualified private building to reduce their energy consumption. Energy efficiency improvements have the potential to contribute to housing affordability, preservation of the building stock, and the creation of healthier and more comfortable living environments for low income households.

The offer adopts a holistic, or “building as a system” approach. Building assessments, comprehensive building audits, enhanced financial incentives, technical services; benchmarking, outreach and education will be used to stimulate housing providers, building operators, and residents. As gas use is typically paid for by the building owner’s resident cooperation, changes in behaviour will be needed to help realize sustainable and persistent savings and benefits.

Sector association collaboration and partnerships including Housing Services Corporation (“HSC”), Ontario Non-Profit Association (“ONPHA”) and Federation of Rental Housing Providers of Ontario (“FRPO”) are critical in raising program awareness and extending outreach efforts to the target market. Understanding common objectives also allows for synergies such as with HSC’s tenant engagement and energy benchmarking programs, Community Champion and Utility Management Program respectively. Enbridge is working with FRPO in enhancing the energy efficiency focus of its training and education programs for its membership. Alignment with municipal housing and social planning initiatives will be crucial as such initiatives target similar audiences with complementary goals. Part of the evolution of the offer is the extension of the low income program elements to the private sector through a demonstration program in 2013, in partnership with the United Way Toronto (“UWT”), City of Toronto, FRPO and Toronto Hydro Electric Systems Ltd. (“Toronto Hydro”). A soft launch of the full scale offer took place in Q3 of 2014 in partnership with the City of Toronto’s Tower Renewal office.

Barriers: From Enbridge’s experience in working with Low Income markets, the biggest challenge in this market is the matter of split incentives, whereby the building owner makes a significant financial investment in equipment or building upgrades, with limited or no ability to recoup their costs.[7] Tenants, who are the ultimate consumers, do not have the same motivation to reduce their consumption. Other

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[7] This point was also made by the OPA in the Board’s EB-2008-0150 Low Income Consumer Stakeholder’s Conference, September, 2008: http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/search/rec&sm_udf10=eb-2008-0150&sortd1=rs_dateregistered&rows=200&from=85386&page=3

barriers that can impact the level of participation among building owners often include:

- Tenant/Landlord relationship;
- Access to capital or financing conditions;
- Uncertainty in market valuation of energy efficiency;
- Security and privacy concerns;
- Complexities and uncertainties in retrofit planning and implementation;
- Lack of confidence in retrofit performance and savings;
- Tolerance for adoption of new technologies;
- Health and safety issues;
- Lack of data on the building stock, or even for individual buildings;
- Social and multicultural diversity among residents;
- Building code violations or poor enforcement of building code;
- Pass through of beneficial improvements to tenants, e.g., rent adjustments; and,
- Municipal regulations, e.g., claw back of operating savings from energy efficiency by Service Manager on social housing units.

Offer Details: Enbridge outlines the following eligibility criteria for the Affordable Housing offer:

- Part 3 Buildings owned and operated by social housing providers as well as privately owned buildings identified as low income;
- Privately owned low income buildings will be municipally informed and census defined. Additional eligibility requirements for private sector participants will

be the subject of discussions between the low income working group of intervenors and stakeholders, and Enbridge; and,

- Social housing and assisted housing buildings as described in the Housing Reform Act of 2011 and 2015-2020 DSM Framework.

Enbridge proposes the following incentives for the offer:

- Fixed incentives calculated based on a fixed dollar amount for smaller types of equipment. Eligible measures that would result in gas savings may include:
  - Condensing boilers;
  - High efficiency boilers;
  - Energy recovery ventilation systems; and,
  - Heat recovery ventilation systems.
- In-suite direct install measures will be as follows:
  - Free showerheads from Enbridge supplied and installed; and,
  - Free supply and installation of heat reflector panels.
- Custom incentives shall be calculated based on projected first year natural gas savings at a rate of $0.40/m^3 saved, up to 50% of the cost of the retrofit. Eligible measures that would result in gas savings include, but are not limited to:
  - Building envelope;
  - Controls;
  - DHW replacement;
  - Drain water heat recovery;
  - High Efficiency Boilers;

  - Make Up Air Units; and,
  - Operational improvements ($0.20/m^3$).
- Half the cost of an energy audit up to $5,000 per building or $0.01/m^3 of gas consumed in the past calendar year (whichever is less);
- Free ASHRAE Level 1 Building Assessment;
- Boiler Tune-Up;
- Resident engagement programs; and,
- Free access to a benchmarking program such as the City of Toronto's STEP Program.

10. Home Winterproofing

Goal: The Home Winterproofing offer, previously known as Home Weatherization, aims to reduce energy costs for Part 9 low-income households by increasing the energy efficiency of their homes, while addressing comfort and some health and safety matters within the homes.

Target Market: Social housing and assisted housing, and income qualified customers residing in low-rise buildings (OBC Part 9).

Background: Low income is typically defined as spending 30% or more of a household's income towards shelter costs. In most large Ontario cities, people who live below the poverty line are burdened with housing problems and subsequent high shelter costs. Shelter costs (including utilities) often consume more than half of a household's income. Based on 2012 Statistics Canada data, approx.13.5% of the households in Enbridge's franchise area can be considered low income.

A high proportion of low income residents are seniors, new immigrants, or low wage earners. Social housing is rental accommodation developed with government assistance for a range of low- and moderate-income households, including families with children, couples, singles, and seniors. These buildings can be owned by governments, as in the case of public housing, or by non-profit or co-operative organizations. Most social housing in Ontario was built between the mid-1960s and the mid-1990s through a combination of federal, provincial, - and joint federal – provincial cost-shared programs. The housing stock for social housing is largely made up of smaller townhouses, with some semi-detached and scattered housing (single-family detached), with a significant proportion using electric space heating.

The Home Winterproofing offer reaches out to low-income households that are often on fixed incomes, rely on income assistance programs, and are generally the most vulnerable to volatile changes in energy markets. Enbridge works with community based organizations to deliver and implement the offer, which is also supported by the Board's Low Income Energy Assistance Program ("LEAP"). LEAP provides low income energy consumers with emergency financial assistance, the certainty of special customer rules, and access to utility DSM and electricity Conservation and Demand Management ("CDM") programs. The 2015-2020 DSM Framework has identified the low income customer group as a priority area for DSM programming.

Barriers: While homes of private low income customers are generally larger than social housing units, low income households are difficult to find, primarily because they are unlikely to self-identify as low income. Further, once found, they are hard to reach due to other barriers such as communication and language challenges. Other barriers to participation in energy efficiency programs among this customer segment include:

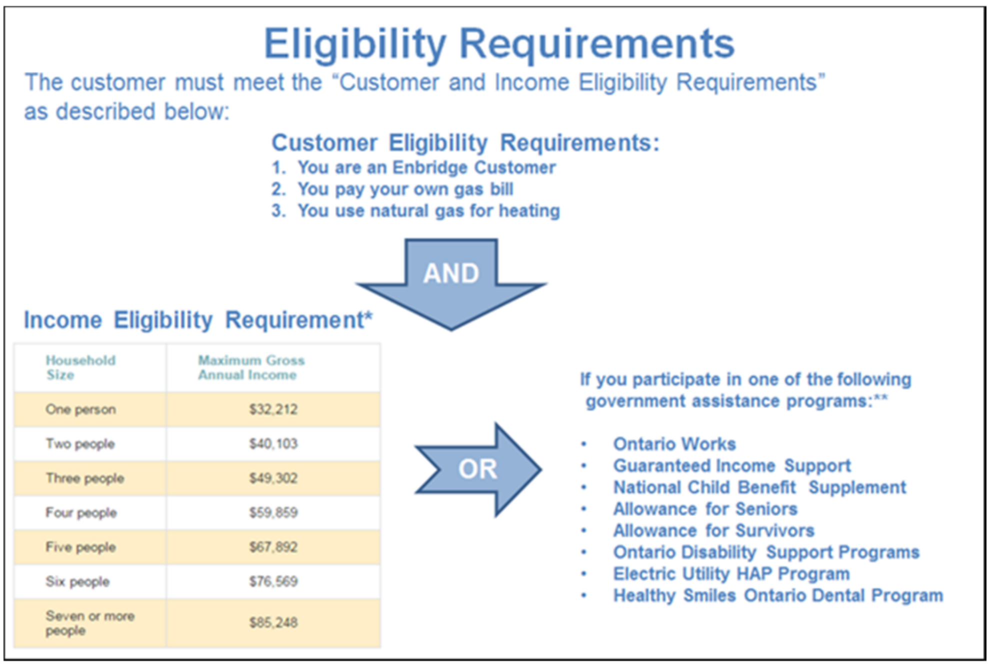
- Affordability and access to funds to make equipment upgrades and repairs;
- Awareness or limited understanding of energy and energy use;
- Competing priorities for basic necessities such as food, shelter, health and safety; and,
- Lack of trust – "nothing is free" mentality, or fear of claw backs of government financial assistance.

In addition, for many Part 9 type homes, the offer has encountered physical and structural problems within the units such as the presence of asbestos or excessive hoarding, elevating the safety risk for the offer contractors, residents and housing providers. In these unfortunate instances, the units are rejected for participation until environmental and safety risks are adequately addressed.

Offer Details: The offer provides a free home assessment and weatherization services (i.e., insulation and air sealing) to qualified Enbridge customers who meet income and customer eligibility criteria. As a direct install offer, there is no financial cost to the participant for the energy assessment or for the weatherization products and services. As a health and safety value-add on, a carbon monoxide monitor is provided where one is not present in the home.

At the time of assessment, the home is also prequalified for water conservation measures (e.g., showerheads and aerators) as well as a programmable thermostat, heat reflectors and a drain-water heat recovery unit. Looking forward, Enbridge intends to include a modest furnace replacement component in 2016.

The eligibility requirements for the offer are described in the graphic below:



* The Income Eligibility Requirement is based on Statistics Canada ("StatsCan") Low Income Cut-Off ("LICO") plus 35% based on community size greater than 500,000. The LICO values are updated by StatsCan annually, and adjusted for program purposes accordingly.

** The government assistance programs listed above are income tested programs and may change from time to time.

Customers that qualify for the Board's LEAP initiative automatically meet the income eligibility requirements of the offer.

Witnesses: S. Bertuzzi, P. Goldman, S. Hicks, R. Kennedy, M. Lister, E. Lontoc, D. Naden, F. Oliver-Glasford, J. Paris

The Home Winterproofing offer will continue to be delivered by community based organizations which have strong relationships with low income interest groups and are well entrenched and trusted within the communities that they serve.

11. Low Income New Construction

Goal: The overarching goal of the Low Income New Construction offer is to promote the adoption of energy efficiency features and practices among developers and builders of affordable housing. This offer is designed to encourage municipalities to take a proactive role in incorporating energy efficiency standards in their own affordable housing plans and programs. The offer will provide financial incentives and enabling support to their affordable housing partners to facilitate the integration of energy efficiency in housing projects.

Target Market: The offer is specifically directed to residential and multi-residential affordable building developments and efforts will focus on working with and through municipal governments, private and non-profit local housing corporations.

Background: Through the Federal-Provincial Investment in Affordable Housing ("IAH") Program, municipal governments own and develop their own affordable housing plans, and can prescribe action to ensure energy efficiency is a consideration for their affordable housing projects.

A homeowner or building owner does not save money in any real sense by refraining from installing cost-effective efficiency measures during project planning and construction. Rather, costs are merely shifted from the time of construction to become added utility expenses post-construction as a result of less efficient choices made during construction. This offer is about motivating and enabling builders and future building owners to make these investments in efficiency up front, so as to reduce energy consumption, greenhouse gas emissions, and low income consumer utility costs in the longer term.

Approaching efficiency improvements from a comprehensive, whole-building perspective can generate additional energy, environmental and health benefits, and contribute to community sustainability and resiliency. Combining energy efficiency improvements and green building techniques, while taking an approach that views housing as integrated with surrounding land uses, can help maximize these benefits.[8] Enbridge proposes to begin this offer as a pilot in 2015, rolling out for full-scale deployment beginning in 2016.

Barriers: Specific challenges to participation in this offer may include:

- The government grant funding for new construction under the federal-provincial Investment in Affordable Housing Program ("IAH") poses financial challenges for builders to explore and/or incorporate energy efficiency and sustainability features that exceed building code requirements;
- The expected building code change in 2017 will make it even more difficult to recognize savings above code;

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[8] Energy Efficiency in Affordable Housing: A Guide to Developing and Implementing Greenhouse Gas Reduction Programs, Local Government Climate and Energy Strategy Series, United States Environmental Protection Agency 2011

- While IAH Program Guidelines for Service Managers encourages enhanced energy efficiency features in project applications, there are neither pathways nor tools available in the IAH program to foster this outcome;
- Private developers are likely to build residential units that will generate higher margins, and therefore, may be less willing to explore more costly energy efficient upgrades; and,
- Applying for public funding subsidies can be cumbersome and onerous, which could discourage builders from participating in government-sponsored initiatives.

Offer Details: The Low Income New Construction offer has been informed by the Company's SBD offers. However, due to the wide range of builders, types and project sizes, certain offer elements have been modified to meet the needs of the target market. Some offer elements, such as the use of the integrated design process inclusive of charrettes and incentives per unit built to energy efficiency standards, will be included in the Low Income New Construction offer.

The offer will provide financial incentives and extend technical support to assist affordable housing builders in exceeding Ontario Building Code requirements by at least 15%. The offer will engage the affordable housing community to encourage adoption of energy efficiency measures and technologies as a means to maintain housing affordability. Eligibility for the offer will be simplified to encourage broader participation among large and small affordable housing participants.

Specifically, the Enbridge offer contemplates the following:

- Enbridge funded workshops, modelling tools, and charrettes that promote the integrated design process, and energy efficient and green construction practices;
- Access to an energy efficiency/sustainability consultant during the various phases of project design;
- Energy education materials targeted to future residents as part of their "welcome to your new home" package.
- For Part 3 (Multi-Residential) developments:
    - Tiered financial incentives depending on the modelled savings achievement. For example, 15%, 20%, 25% above code costs will be $3,000, $10,000; and $25,000 respectively, plus an additional up to $2,250 per unit, to a maximum of $100,000 per building.
    - At building completion, provide a commissioning incentive of up to $10,000.
- For Part 9 (Residential) developments that build an 'Energy Star home', a prescriptive incentive of up to $3,000 will be provided per home.

The financial incentives above are indicative of Enbridge's intended approach, but are subject to change as informed by the 2015 pilot. It is important to note that in 2017 there will be a change to the Ontario Building Code. The expected amendment is anticipated to include an increase to the required energy efficiency of newly constructed buildings of approximately 15% above the Ontario Building Code of 2012. As such, all programs that seek to address the overall efficiency of a building will need to be addressed as the updated Code comes into effect.

Market Transformation and Energy Management Program

Enbridge has undertaken Market Transformation offers since 2006 with the aim of achieving long term change leading to comprehensive culture or code and standard changes. The purposes of Market Transformation programs are well articulated in a study published by the Institute for Industrial Productivity, in collaboration with Energy Pathways LLC, and the American Council for an Energy-Efficiency Economy (ACEEE).

> Market transformation, unlike resource acquisition, has a much longer-term focus, and aims to address structural barriers to energy efficiency such as outdated building codes or lack of vendors offering an emerging technology. Its goal is to change marketplace behavior to increase acceptance of energy efficiency technologies and practices, but this can take time (often 5 to 15 years). Savings often grow slowly in early years, but when savings start to accrue, they are more likely to be persistent without relying on direct intervention like resource acquisition does.[9]

The table further below summarizes Enbridge's Market Transformation and Energy Management ("MTEM") Program and the offers contained therein, including eligibility measures, proposed incentives, technical assistance, training and education, marketing communication activities that are planned to support objectives, and the delivery channels that will be used.

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[9] Institute for Industrial Productivity. 2012. Taylor, Trombley and Renaud. Energy Efficiency Resource Acquisition Models in North America,

Market Transformation and Energy Management Table

	Eligible Measures	Incentives	Key Elements
Savings By Design - Residential	Thermal envelope improvements, gas furnaces and boilers, water heating, low water flow devices, HRVs, drain water heat recovery	Fixed incentive of $25,000 per builder for IDP Incentive of $2000 per home for OBC > 25%	**Technical Assistance:** Enbridge funded workshops, modelling tools, and charrettes **Training/Education:** IDP and energy modeling training **Marketing/Communication:** Promotion directly to builders, energy raters and modelers, mass communication to homeowners
	Eligible Measures	**Incentives**	**Key Elements**
Savings By Design - Commercial	Thermal envelope improvements, gas furnaces and boilers, water heating, low water flow devices, HRVs, drain water heat recovery	IDP ~$25,000 $15,000 completion of pre-construction certified energy model $15,000 completion of post construction certified energy model	**Technical Assistance:** Enbridge funded workshops, modelling tools, and charrettes **Training/Education:** IDP and energy modeling training **Marketing/Communication:** Promotion directly to builders, energy raters and modelers
	Eligible Measures	**Incentives**	**Key Elements**
New Construction Commissioning	HVAC and controls. Envelope, lighting controls, air distribution systems, plumbing and piping systems	Incent projects that develop and utilize a project specific building commissioning plan. Each participant will receive $12,500 to put towards the cost to develop a final plan	**Technical Assistance:** Installation for specific measures as required **Training/Education:** Commissioning plan and energy modeling training **Marketing/Communication:** Promotion to builders, commissioning agents architects/engineers, contractors, and modelers

Witnesses: S. Bertuzzi, P. Goldman, S. Hicks, R. Kennedy, M. Lister, E. Lontoc, D. Naden, F. Oliver-Glasford, J. Paris

	Eligible Measures	Incentives	Key Elements
My Home Health Record (Opower)	Behavioural offer / Social Benchmarking	Enbridge provided energy saving reports/advice	**Training/Education:** Training and education of customers **Marketing/Communication:** Targeted households
	Eligible Measures	**Incentives**	**Key Elements**
Home Rating	Home Energy Audits	Energy Audit Incentive $395.50 (350+hst)	**Technical Assistance:** Development of training for consumer home energy education sessions **Training/Education:** Training for consumers, realtors, energy raters, home inspectors **Marketing/Communication:** Mass marketing to consumers, realtors, energy raters, home inspectors
	Eligible Measures	**Incentives**	**Key Elements**
Energy Compass	Diagnostic service	Customized direct to customer, interpretation of benchmarking results	**Technical Assistance:** Develop capital and / or operational improvement recommendations to improve energy performance **Training/Education:** Provide an energy performance comparison of buildings in customer's segment with similar characteristics **Marketing/Communication:** Enbridge to engage in customer relationships and build a dialogue around energy efficiency

	Eligible Measures	Incentives	Key Elements
School Energy Competition	Checklist will be developed for participants focusing on conservation initiatives and education events	Prizes for 1st, 2nd and 3rd places within the annual competition. ($12,000 total for all prizes)	**Technical Assistance:** Enbridge funded workshops and developed curriculum **Training/Education:** Training within schools – including but not limited to social marketing; events; webinars and other events. **Marketing/Communication:** Marketing will be focusing on the participants to increase engagement in conservation initiatives
	Eligible Measures	**Incentives**	**Key Elements**
Run It Right	22 options for low cost, system optimization installs	Amounts range from $10,000 for a complex high consuming building to $2,500 for a smaller, simple building.	**Technical Assistance:** Customized energy building report provided **Training/Education:** Access to Enbridge Energy Management Information System (EEMIS) for 12 months in addition to training and support **Marketing/Communication:** Case studies, trade magazine advertisements, sponsor industry partners, direct mail
	Eligible Measures	**Incentives**	**Key Elements**
Small Commercial & Industrial Behavioural	148,000 small commercial and industrial customers who consume less than 100,000 m3 annually	3-4 reports over the heating season detailing the customer's consumption relative to similar facilities	**Technical Assistance:** Provide details on equipment and energy consumption as well as available incentives & services **Training/Education:** Refer customer to specific DSM / CDM programs **Marketing/Communication:** Access to a back-end web portal, intermittent email reminders to ensure customers are engaged.

	Eligible Measures	Incentives	Key Elements
Comprehensive Energy Management	Industrial customers whose annual gas consumption between 340,000 m3 and 5,000,000 m3	Various incentive offers ranging from $0.30/m3 per cubic meter saved to funds to promote energy awareness training	**Technical Assistance:** Quantifying energy use and identifying opportunities **Training/Education:** Plan and analyze data and potential opportunities **Marketing/Communication:** Enbridge to facilitate and lead customers through a set of tools, guidelines and resources to action specific suggestions

12. Savings By Design – Residential

Goal: The goal of the Savings by Design ("SBD") Residential offer is to use the Integrated Design Process ("IDP") to demonstrate to builders the potential for achieving higher levels of energy and environmental performance through the application of alternative design approaches. This demonstration and awareness will be supported with performance incentives that encourage builders to build new homes that are 25% better than homes built to Ontario Building Code ("OBC") standards.

Target Market: The target market is builders of new, Part 9 residential low rise houses (townhouses, semi-detached and detached homes) in the Enbridge franchise area. The Company's intent is to engage directly with builders who construct a multiple number of homes within Enbridge's franchise area. The ultimate beneficiaries of better designed homes will be Rate 1 residential customers.

Background: In 2012, Enbridge began a more holistic, multi-measure offer geared toward changing the market by transforming the process through which builders design and construct subdivisions. This approach was grounded in providing a solid education to the builders by providing access to experts during the design phase of a project, and then following up with incentivized performance. Recognizing the barriers in the marketplace, Enbridge developed SBD to help residential builders achieve higher levels of energy and environmental performance through the application of the Integrated Design Process ("IDP").

Builders and Developers are governed by the Ontario Building Code (Ministry of Municipal Affairs and Housing) which is designed to protect public health, safety and general welfare as they relate to the construction and occupancy of buildings and structures. The Code has an environmental focus, putting in place measures that reduce greenhouse gases, protect air, water and soil quality, and conserve energy. The Code features new standards for residential wastewater treatment, on-site sewage dispersal beds, as well as changes to technical, maintenance, and monitoring requirements for sewage systems. It is important to note that in 2017 there will be a change implemented to the Ontario Building Code.[10] The expected amendment is anticipated to include an increase to the required energy efficiency of newly constructed buildings to approximately 15% above the Ontario Building Code of 2012. Offers that seek to address the overall efficiency of a building will need to be adjusted once the updated Code comes into effect.

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[10] http://www.mah.gov.on.ca/Asset10223.aspx?method=1 (Slide 12-13)

With roadmaps leading to 2020 for sustainable housing, and a 2030 roadmap calling for net-zero energy and water reductions in newly constructed homes and buildings, offers like SBD look to have a long lifespan in moving builders and markets towards achieving the permanent end states advocated within these various sustainable / energy efficiency goals.

Furthermore, NRCan has proposed moving away from EnerGuide for New Houses to a new system, similar to the Home Energy Rating System ("HERS") used in the U.S. that will use energy intensity metrics, most likely GJ/m^2. Both systems will be active in the Ontario marketplace during the current and the next five year Ontario Building Code cycle.

The IDP was rarely, if ever, used in the residential new construction sector until the launch of SBD in 2012. Encouraging residential builders to step away from traditional design paradigms and use a more holistic approach to new construction remains a significant change in process. Most builders do not have on-staff architects and rely on designs that are contracted to third party firms who create drawings while considering the architectural features and building size. They typically use a standardized specification based on the Ontario Building Code. The selection of the Heating, Ventilation, and Air Conditioning ("HVAC") and related systems is conducted subsequent to the architectural design process by the HVAC contractor. These contractors rely on tried and true systems with little consideration for other design elements within the building. Conversely, designers rarely incorporate consideration of heat loss, system efficiency or related energy performance into their design activities. Consideration for long-term energy performance beyond the requirements of the Ontario Building Code is not a priority for many builders.

The following table presents a summary of the proposed strategy and offer elements utilized to drive results:

Strategy - IDP	Offer Elements - IDP
Introduce concept to builders and demonstrate the potential improvements and energy savings that are achievable	Recruit builders, Enroll them in the IDP workshops
Work to ensure industry has the capability to deliver IDP and the requisite energy modelling	Support for sector associations who train energy raters, IDP professionals, etc.
Encourage builders to apply what they have learned to an actual new build	Provide incentive for homes achieving greater than 25% above 2012 OBC efficiency and 15% above 2017 OBC efficiency
Support the consideration of higher energy efficiency requirements as part of OBC development	Monitor OBC development and ensure that OBC officials are aware of the market activities that might support a higher OBC

Barriers: The housing market landscape is shifting. In addition to adhering to the 2012 Ontario Building Code, builders are also facing an adjustment in the traditional housing market. Builders have to assign resources to re-engineer, design, and build to respond to a change in demographic demand for smaller homes. At the same time, builders must diversify their portfolios to adapt to low-rise multi-residential units as a result of a decrease in the availability of land and higher costs to develop that land. Further, Municipalities are reacting to an infrastructure deficit by increasing development charges, as well as mandating storm water management plans, energy performance, and sustainable design requirements for new subdivisions.

Builders today construct many different forms of housing in response to different market needs. For this reason, builders need to experience the IDP in more than one application to truly appreciate its effectiveness. By way of example, Ontario contains an array of different degree day zones, different urbanization levels, and a wide variety of income levels and demographics. As a result, limiting builders to completing the IDP through SBD only once as the offer is currently designed, establishes a design that can be used in only one facet of their product portfolio, in one specific geography, for one proposed demographic, limiting its applicability. Further to this, builders do not build only one design per project, but will incorporate numerous designs with a plethora of variations and modifications attached to each. This historical offer requirement limits the number of homes which a builder might construct above the Ontario Building Code as a result of participation in SBD.

Offer Details: The SBD approach is a total energy approach, as opposed to a gas-only approach. To date, the SBD offer has been well received by the builder community as it has become more difficult to build to Code, let alone above Code. In addition to the IDP process, funding has assisted the efforts of builders to continually improve. Commencing January 1, 2017, the Ontario Building Code will change again, increasing required energy performance by approximately 15% above the 2012 Code. Therefore, SBD as of January 1, 2017 will require energy performance of homes be 15% above the 2017 OBC or align with EnergyStar standards.

The primary means to educate and change the marketplace will remain the IDP. In addition, the eligibility criteria for builders should be forward looking, such that a builder identify that they will be building at least 50 homes in the community to which the IDP applies in order to qualify to participate in the offer.

It is unrealistic to expect that one time through the offer will be enough to cause builders to change their business practices. On this basis, Enbridge will allow builders to enroll in SBD more than once for additional subdivisions / developments on the basis that the Company establish a descending incentive scale for repeat builders. A scaled down incentive over time – in support of eventual sustainability of a market change - better represents the lifecycle of most market transformational activities. A sliding incentive that is reduced each time a builder goes through the SBD process allows participants to experience the IDP across their portfolio in different communities.

The performance incentives for SBD Residential will be as follows:

- Builders that complete the IDP portion of the offer for the first time are eligible to receive $2,000 per home completed to the SBD standard (up to 50 homes);
- Builders that complete the IDP portion of the offer for the second time are eligible to receive $1,000 per home completed to the SBD standard (up to 100 homes);
- Builders that complete the IDP portion of the offer for the third time are eligible to receive $500 per home completed to the SBD standard (up to 200 homes).

13. Savings By Design - Commercial

Goal: The goal of SBD Commercial is to increase the number of buildings built to 25% above the current OBC in the new construction market, while simultaneously preparing builders for the upcoming Code update in 2017.

Target Market: The target market for this offer includes commercial and industrial buildings covered under the Ontario Building Code, Part 3.

Background: Enbridge has provided commercial new construction programming since 1999, beginning with the Design Assistance Program ("DAP") which was developed to engage the new building design community to design and model new construction buildings to higher levels of energy efficiency.

The SBD offer was introduced in 2012 and represented an evolution of the DAP program, wherein participating design teams were expected to provide a more complete IDP experience for their respective projects. In this offer, participants must adhere to the IDP principles as recognized internationally and must provide a final report that reflects that undertaking. The intent is to achieve higher energy performance (25% better than the 2012 Ontario Building Code) through a combination the following types of activities:

- Improved sizing and design;
- Optimization of passive solar, day lighting, and natural ventilation;
- Integration of high efficiency lighting and HVAC systems;
- Integration of lighting and HVAC controls to respond directly to occupant loads;
- Reduction and/or optimization of internal loads;
- Improving the thermal characteristics of the building envelope; and,
- Managing the environmental impacts.

Enbridge's support is not only in the facilitation of the IDP, the bringing together of industry experts, conservation authorities, and municipalities, but also through the provision of financial incentives. The financial support covers the cost of the IDP and provides an incentive at both pre and post construction phases based on specific deliverables. Since 2012, more than 40 projects have gone through the IDP process. Over the past three years, there have been key lessons learned that Enbridge is proposing to use to further evolve the offer. Specifically, the fundamental learnings have been:

- Make the offer more available to a greater portion of the commercial market (smaller buildings) as a large portion of completed IDPs have been focused on multi-residential projects;
- Leverage available incentives more effectively to provide more support post-IDP / pre- and post-construction; and,
- Enhance the commissioning aspect of the offer (see New Construction Commissioning Project).

Barriers: The construction process remains a time consuming and uncertain one, challenged by ever-increasing environmental municipal demands. In addition, code changes every five years keep present an additional challenge for builders. The next code change is scheduled for 2017 and is expected to have an energy efficiency increase of 15% over the previous 2012 code.

Other barriers that builders face in pursuit of energy efficiency include:

- Lack of trades people and lack of training regarding quality installation;

- Availability of land has decreased and the cost of that land has increased affecting affordability;
- The recovery from the recession has been slow; and,
- Buildings are for the most part not being adequately commissioned.

Offer Details: The SBD Commercial offer is direct-to-builder/developer delivered by an internal sales team. Eligibility criteria include the following:

- Commercial, multi-residential or industrial buildings covered under the Ontario Building Code Part 3;
- A minimum threshold of 50,000 square feet per project (including aggregate multi-location projects);
- Building(s) must be within Enbridge's franchise area, or for aggregate projects 75% of the project square footage must be in the franchise area;
- Building(s) must be in the design phase or earlier in the process;
- Building construction must be completed within five years of signing the agreement, and commissioning must be completed no more than one year after that; and,
- Builders will be eligible to participate in the offer multiple times for different projects.

The offer consists of the following design elements:

- Integrated Design Process - approximately $30,000 Cost;
  - ½ day Visioning Session
  - Full day charrette addressing the following:
    - Energy Efficiency

        - Site Sustainability
        - Sales and Marketing
        - Design Commissioning
        - Additional as required by the individual builder
    - Final SBD Report
- Provision of post charrette support in getting pre-construction more efficient than Code, based on final SBD report;
- Performance incentives – builders that complete the IDP portion of the charrette are eligible for the following incentives:
    - $15,000 upon the completion of a pre-construction certified energy model that demonstrates that the building will be built 25% above code, along with final design stage plans and specifications;
    - $15,000 upon the completion of a post construction certified energy model that demonstrates that the building has been built 25% above code, along with the final certified commissioning report.

14. <u>New Construction Commissioning</u>

<u>Goal:</u> The New Construction Commissioning offer intends to incent builders to use the building commissioning phase of construction to ensure that a facility is optimized to operate at the most efficient level possible; that it meets the needs of the building owner and occupants; and to provide training to facility operators. The aim of this offer is to have the building operate as it was designed, to ensure that systems are installed, functionally tested, and capable of being operated at the highest performance level.

Target market: Builders and designers of new, Part 3 commercial buildings in Enbridge's franchise territory, largely within Rate 6. Enbridge will be targeting its promotional activity to owners, builders and developers, and design teams, including architects, design engineers, and energy modelers.

Background: The aim of commissioning newly constructed buildings is to ensure that they meet, if not exceed, the performance and energy savings potential possible, based on their design. Commissioning is a systematic, forensic approach to quality assurance, as opposed to a technology per se. Commissioning is a risk management strategy that should be integral to any systematic approach to garnering energy savings or emission reductions.

There are many stakeholders involved throughout the life of a construction project. The work environment and culture of a construction project is unique compared to most working conditions. A typical construction project consists of groups of people, normally from several organizations, that are hired and assigned to build a facility.

Enbridge has been delivering the Savings by Design ("SBD") offer to the new construction commercial market since 2012. The Commercial SBD offer was designed to work with builders and developers in the pre-design phase of a commercial building. Through this offer the Company has learned that commissioning is an important step in the process of building highly efficient buildings, but one where significant improvement is needed. Enbridge is proposing this offer to minimize the potential that buildings, although planned to high efficiency levels, do not operate as intended. Furthermore, not all buildings can participate in the SBD offer as they may already be past the design stage, or they may not meet other eligibility criteria. In addition, a key driver of the Commissioning offer is a continued policy drive at all levels of government, towards sustainability, with a goal of meeting a net-zero usage for water, waste, and energy by 2030 in new buildings.

Commissioning is an underutilized strategy for saving energy and money, and reducing greenhouse gas emissions.[11] In this field, it is important to strike a healthy balance between standardization and recognition that each building is unique and must be approached as such.

When a building is initially commissioned it undergoes an intensive quality assurance process that begins during design and continues through construction, occupancy, and operations.[12] Commissioning ensures that the new building operates initially as was intended, and that building staff are trained to operate and maintain systems and equipment properly. To obtain a high quality energy efficient building, four phases have to be completed:

1. Design Brief
2. Design Phase
3. Construction Phase
4. Commissioning Phase

[11] A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions, Evan Mills, PhD., Lawrence Berkeley National Laboratory, June, 2009.
[12] Ibid.

Commissioning can be considered a bridge between the design and delivery of a project. The more complex and interconnected the systems or building the greater the need for commissioning. There are both short and long-term benefits that commissioning provides to a building. In the short-term, it can help the project team develop an efficient design, and in conjunction with design modeling, serve to reduce overall design and construction time. Long-term benefits include valuable performance benchmarks, acceptance criteria, a baseline for the future operation, and ongoing commissioning, operation and maintenance of the facility.

Commissioning a project with energy efficiency in mind specifically increases costs for builders due to specialist consulting fees, additional documentation, and commissioning testing. However, the extra steps (and associated costs) advocated in the commissioning process are justified by more durable building envelopes that contribute to increased energy efficiency and comfort, and reduced life cycle costs. The issue is that while the cost of commissioning is assigned to the builder, the benefits of reduced life cycle costs are assigned to the building owner.

Barriers: Affordability is seen as the most significant barrier to sustainable construction, indicating that sustainable construction is more expensive to execute in comparison to standard practices. Additional barriers include perception about increased project costs and lack of experience with relevant techniques and technologies. The increased project costs can manifest itself both in the design and the construction phases of a project. Prevalence of conventional thinking and aversion to risk stem largely from inexperience and can deter stakeholders from pursuing these project initiatives.

Enbridge's experience indicates that changing conventional building design and procurement practices within the construction industry can be challenging. The practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's lifecycle from siting to design, construction, operation, maintenance, renovation, and deconstruction is arguably the single-most cost-effective strategy for reducing energy, costs, and greenhouse gas emissions in buildings in the twenty-first century.

Offer Details: The following table presents a summary of the strategy and the proposed offer elements to deliver the New Construction Commissioning offer:

Strategy	**Offer Elements**
Introduce concept to new construction projects and demonstrate the potential improvements and energy savings that are achievable.	Recruit new construction projects; Enroll them in the commissioning offer. Ensure they did not participate in SBD for this project.
Work to ensure industry has the capability to deliver commissioning and the requisite energy modelling.	Support commissioning agents, contractors, professionals, etc.
Encourage construction projects to apply what they have learned to an actual new build commissioning design practice.	Each participant will receive $12,500 to put towards the cost to develop a final plan.
Support the consideration of higher environmental and energy efficiency requirements.	Monitor OBC development and ensure that OBC officials are aware of the market activities that might support commissioning in OBC.

The approach for the Commissioning offer will be broken into separate initiatives based on different phases of the construction cycle:

- Construction Phase Commissioning – An Enbridge initiative to reward projects that develop and utilize a project specific building Commissioning Plan. A commissioning subject matter expert would be provided to help develop or write a project specific Commissioning Plan. The project team would subsequently evidence Commissioning by producing a completed Commissioning report and Commissioning Issues Log detailing the issues found and resolved during the project's construction.
- Performance Based Commissioning – An Enbridge initiative to reward new construction projects that evidence building operational energy efficiency
- Building Commissioning Measurement & Verification – An Enbridge initiative to reward projects that develop and implement a project specific Measurement and Verification (M&V) plan.

15. <u>My Home Health Record</u>

<u>Goal:</u> The primary goals of the My Home Health Record ("MHHR") offer are to help customers reduce consumption through awareness of their energy usage relative to like customers, drive participants to alternate DSM programs, and increase energy literacy.

<u>Target Market:</u> The target market for MHHR is Rate 1 residential customers.

<u>Background</u>: While Enbridge has a long and successful history in new construction and retrofit programs, a new opportunity to affect behaviours has emerged as the

next frontier of energy efficiency. The main motivation behind behavioural programs is to ensure that homes or buildings are operated at their peak design capability to ensure the maximum potential for energy efficiency is realized. In addition, the same information used to educate a broader audience of consumers can be used to drive behavioural changes and identify where retrofit dollars can most productively be employed.

In its recent DSM Framework Filing Guidelines, the Board called on the natural gas utilities to, "benchmark energy usage to enable detailed data analysis and compare usage with other similar customers..."[13]

The Board further called on Enbridge to, "provide a greater level of customer-specific educational information and data to help customers use natural gas more efficiently."[14]

To date it has been difficult for the Company to put into market, a broad reaching program for its largest customer segment due to budgetary constraints and an objective to maximize cost-effective natural gas savings (as opposed to enable all cost-effective DSM). The MHHR offer will engage a much larger audience and promote energy awareness and energy literacy on a broader scale, with the ultimate goal of driving changes in behaviour and greater interest in pursuing deeper savings, whether due to operational, behavioural or retrofit activity.

[13] EB-2014-0134 "Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020)" Dec. 22, 2014, p.6
[14] Ibid, p.5

This offer does not rely solely on technology to improve efficiency but rather focuses on customer commitment, action, and engagement, in order to achieve results. It is commonly understood that a key driver in attaining behavioural change relates to not only communicating what alternatives are available to customers, but also communicating what a customer's peers are achieving in relation to their consumption and efficiency. The offer relies on human nature and the desire to avoid being among the worst performers.

Enbridge intends to work with OPower to deliver the MHHR offer by providing customers with better information on their energy use in addition to personalized energy saving advice. The MHHR offer motivates customers to use measurably less energy and, all else being equal, save money on their monthly energy bills. As energy efficiency technology continues to advance, behavior will increasingly play a more important role in driving further incremental energy savings.

Barriers: Specific barriers to behaviour modifications may include:

- Many residential customers are not adequately motivated to modify behaviour;
- Perception vs. Behaviour Change – In the past it has been proven easier to change a person's thoughts around a specific topic (perception), versus motivating them to take action (behaviour);
- Privacy laws and practices present a challenge; and,
- Ontario's natural gas distributors are not enabled with time-of-use, interval metering infrastructure.

Offer Details: The MHHR offer is a no-charge initiative for the customer organized around two concepts. The first is to motivate consumers to change their behaviour by putting their usage in context. The second is to help consumers make energy efficient choices through providing personalized energy efficiency tips, and information on energy efficiency offers that would be relevant to them.

Enbridge's offer is designed with the following characteristics:

1. **Delivery of reports:** Targeted households automatically receive one welcome insert to introduce them to the offer followed by four home energy reports annually. These reports provide periodic updates on the energy usage behaviour of a given household, and offer tips for saving energy. In addition to the physical reports mailed out, reports will also be emailed to those that have provided an email address to Enbridge.

2. **Delivery of web portal**: All participants will have access to a web portal that currently resides on the myEnbridge website. This site will enable participants to create a profile, perform an online audit, access energy savings tips, monitor usage over time, and compare usage to neighbours for benchmarking purposes.

3. **Ability to opt-out**: All participants will have a clear method for opting out of the offer if they no longer want to receive the information.

Once enrolled in the offer, customers will receive individually targeted savings tips based on their energy usage patterns, housing characteristics, and demographics.

Enbridge intends to roll the offer out to 500,000 customers in 2015, expanding the offer to 1,000,000 customers in 2016. The 1,000,000 participants will be targeted based on the following composition:

- Group 1: 775,000 – highest consumption non-ebill participants
- Group 2: 225,000 – highest consumption ebill participants

The offer's delivery will vary slightly based on the two groups. Group 1 (comprising 775,000 customers) will receive the following:

- A mailed introductory letter;
- 4 paper home energy reports;
- 8 Emails (if a valid email is on file and available); and,
- Web access to their energy consumption data through signing up for MHHR.

Group 2 (comprising 225,000 ebill participants) will be approached slightly differently, based on their self-identified preference for online communication. This group will receive all of the communication above, however their energy reports will only be provided by email, rather than by paper.

16. Home Rating

Goal: Achieve voluntary adoption of a home rating system that becomes standard practice in the resale home market, similar to the home inspection experience.

Target market: This offer is targeted to Rate 1, residential customers, home energy evaluators and real estate agents.

Background: The mandatory introduction of a home labelling system was originally proposed as part of the Green Energy and Green Economy Act, but this provision was subsequently removed after opposition from the real estate industry. In response, the Home Labelling offer began in 2012 and was developed to educate the residential market (realtors and homeowners) to understand a home's energy rating and its value, with a goal to encourage widespread adoption of a voluntary home energy rating disclosure, so that an eventual requirement could be introduced in the future by the government with less resistance.

Information gathered from The Toronto Real Estate Board likens the home labelling initiative to the home inspection market. In the early 1980's, home inspections as a condition of offer were a rare occurrence in Ontario. By 1985, home inspection as a condition of offer was common place. Today, virtually all potential home sales include home inspection as a condition of sale.

Energy rating and subsequent home labelling should matter most at or near the time of sale. Buyers in particular should be interested in knowing the energy rating of the home, while sellers of homes that have a high energy rating may experience a price premium for their homes. Those whose homes have a lower rating might consider retrofit activities designed to increase their home energy rating. From either the seller or the buyer's perspective, there is an opportunity to influence the various retrofit activities that occur in a home, given that considerable renovation activity – for functionality, aesthetics or energy efficiency reasons – occurs prior to or within two years after the sale of a home.

The Home Rating offer is designed to take advantage of this window of opportunity by introducing energy ratings into the residential resale marketplace, with the aim that homes with a higher rating will see a higher market value than homes with a lower score. This will help to encourage homeowners to include energy efficiency as part of their renovation expenditures. With this information available, potential home buyers would also be able to ask what the energy rating is and, if no assessment has been made, they could make their offer subject to assessment, just as offers are made subject to a home inspection.

In 2012, activities focused on securing commitments from brokerages; creating awareness and educating realtors on the value of home energy ratings. There was one consistent metric throughout 2012- 2014, which was obtaining Commitments from realtors collectively responsible for more than 5,000 listings. In 2013, a second metric for marketing homes listed with an energy rating was added to Enbridge's DSM scorecard.

Enbridge continues to believe that a voluntary system designed to gain traction in the market using existing infrastructure is an appropriate approach. The objective of the initiative is to achieve voluntary adoption of a home rating system to help transform the market until such point as it becomes standard practice or mandatory requirement, in the home resale market.

Barriers: Typically, real estate agents are not interested in asking clients if they have an energy label or rating for their house. In addition, their clients typically do not ask if a house they are considering buying has an energy label / rating although most people will say it is an important factor for them and they may ask for utility bills. This apparent inconsistency occurs for several reasons:

- Lack of understanding of an energy rating;
- Perceived costs for retrofit activities and lack of understanding of the impact of energy retrofits on utility bills and of the home's untapped potential for energy savings;
- Energy Labels / Ratings are confusing and do not depict true operating costs;
- Concern that an energy label / rating will make a house more difficult and take longer to sell; and,
- Concern around the cost of the audit to identify the energy rating for the home.

Offer Details: Enbridge proposes support that is initially focused on establishing the necessary conditions for eventual market adoption. This includes a two-pronged approach aimed at creating the demand for a home rating while also building the market's capability to deliver ratings.

Through a variety of communication campaigns, including mass outreach and direct marketing to select realtors, home inspectors and more broad scale communications to homeowners, the initial goal will be to influence the attitudes and perceptions of homeowners, the real estate community and home inspectors regarding the benefits of applying a home rating system to resale homes. These activities may also encompass workshops or similar knowledge focused events. Concurrently, communications will be developed that target municipalities and financial institutions to ensure that they also understand the benefits of a home energy rating.

Ultimately, home rating assessments are expected to be undertaken by independent energy raters as qualified through the eco-Energy Retrofit program and / or by home inspection companies who also have the necessary energy rating qualifications. Organizations that already deliver these services can be leveraged to assist with the communications effort by encouraging their prospective clients to "post" their energy rating if they are selling their home. Enbridge would also use other residential programs (Home Energy Conservation and Savings by Design) to drive increased understanding, knowledge and perceptions around the value of an energy rating/performance.

In 2016, Enbridge will continue to lead the market in understanding the value of a home energy rating, with the end goal of encouraging mandatory labelling. Enbridge will focus on customers buying and selling homes, as the energy audit experience provides the knowledge and understanding which can in turn drive behaviour changes and data-driven decision-making.

17. Energy Compass

Goal: Energy Compass is a benchmarking initiative which will allow customers a better opportunity to manage their consumption by fostering awareness and the adoption of best practices. Identifying poorly performing facilities or operations allows customers to pinpoint how to best strategically invest in efficiency upgrades to improve their bottom line. The goal of the Energy Compass initiative is to motivate customers to understand their energy usage, and to ultimately take action to improve it.

Target Market: Energy Compass is available to any commercial or industrial customer in Rates 6, 110, 115, 135, 145, or 170.

Background: According to NRCan, the benefits of energy benchmarking include:

- Identify and recognize high performing buildings;
- Identify buildings with the greatest opportunity to save energy;
- Inform and educate stakeholders (operators, building managers, occupants, senior management);
- Establish desired performance levels for buildings;
- Monitor progress towards goals;
- Maintain the energy savings and look for new ways to improve; and,
- Identify anomalies in energy use that deserve further investigation.[15]

The Energy Compass initiative is part of Enbridge's value proposition to help customers achieve their conservation goals by identifying buildings that are candidates for efficiency improvements. A key advantage of the initiative is that it allows Enbridge staff to engage with customers to build a dialogue around energy efficiency. The fundamental aim is to evolve from a transactional relationship towards a consultative model that includes frequent dialogue and greater discovery of gas saving opportunities. This platform allows the Company to educate customers on the full range of energy efficiency services and incentives available.

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[15] Improve Your Building's Energy Performance: An Energy Benchmarking Primer, Natural Resources Canada, 2014, p. 7.

The ultimate goal is to lower operational and / or maintenance costs for customers.

The Energy Compass initiative has been offered since 2012 and uses building characteristics to plot and rank the energy intensity of facilities. The initiative is currently available to any commercial or industrial customer that owns and manages a portfolio with a minimum of five buildings. Customers that meet these criteria could come from any of the major commercial sectors (Hospitals, Multi Residential, Retail, University & Colleges, Offices, or Schools).

Over time, Enbridge has been able to gather more and better building characteristic information across multiple segments within the commercial and industrial sectors. As a result, the ability to plot specific facilities against similar buildings has been improving; increasing the value of benchmarking overall.

Barriers: To date, one of the key barriers to greater adoption of the initiative has been the inability of customers to see performance relative to their competitors, particularly among multi-residential property management firms. Customers have been explicit in their desire to be able to benchmark against their competitors, even if those competitors remain anonymous. It is Enbridge's intention to build in this functionality by 2016, bolstering the value proposition for customers.

Uptake of the Energy Compass initiative since 2012 is summarized in the table further below:

Customer Segment	Count of Project	Sum of Floor Area (sq. ft.)	Sum of Unique Account	Sum of Unique Addresses	Sum of Unique Building
Condominium	13		13	13	13
Health Services	5	447,750	5	5	5
Hospital	24	7,128,121	12	8	9
Multi-residential	554	72,414,672	541	538	538
Municipality	677	10,369,940	279	235	371
Office	28	11,038,986	28	26	26
Schools	806	67,191,003	798	709	710
Warehouse	5	319,565	5	5	5
Grand Total	**2812**	**186,948,373**	**1721**	**1552**	**1716**

Offer Details: Energy Compass is a free diagnostic service designed to identify energy efficiency opportunities for capital and operational improvements. The Energy Compass performance report allows customers to:

- Identify buildings that consume higher than average natural gas consumption;
- Use a statistical methodology to identify key drivers that predict natural gas consumption in the customer's building portfolio (such as area, age, and size);
- Provide an energy performance comparison of buildings in the customer's segment with similar characteristics;
- Develop capital and / or operational improvement recommendations to improve energy performance.

The value that Enbridge brings through the use of the Energy Compass tool is in providing customized direct to customer interpretation of benchmarking results. That is, Enbridge can help the customer understand and interpret the data, and use this to form recommendations for how to improve performance moving forward.

The Energy Compass initiative is a non-scorecard initiative which the Company will undertake for the benefit of its customers and in the hopes of driving participation in other DSM offers, in particular Run it Right.

18. School Energy Competition

Goal: Educate and empower students to take action on energy use within their schools, homes and communities.

Target Market: This offer is targeted to primary and secondary schools, which are primarily Rate 6 customers.

Background: Schools offer a unique opportunity for DSM programming. Students are the future leaders of society, and influencing energy management awareness, education, and behavior into their worldview from a young age will help to permeate deeper values of conservation in our society. Said another way, influencing tomorrow's leader will be a cornerstone of fostering a culture of conservation, pursuant to the Board's direction in the DSM Framework.[16]

The table below describes the market that can be affected by this offer:

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[16] EB-2014-0134 "Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020)" Dec.22, 2014, p.5

2013 Data	# of School Boards	Elementary Schools	High Schools	Estimated Gas Consumption (m^3) 2013
Public	11	1436	292	133,066,513
Catholic	10	645	120	38,708,555
French	4	136	45	8,919,898

Total Consumption from all School Boards in the Enbridge Area in 2013 was 143,372,498 m^3. The largest school board is the Toronto District School Board, with 451 Elementary and 102 High Schools, and an estimated consumption of 59,794,643 m^3 in 2013. The schools with higher natural gas consumption are typically high schools, where the School Competition offer will be focused. Elementary schools are typically smaller, though they do contain more students.

Youth outreach programs are a unique opportunity for Enbridge to connect with students and their families. With this new offer, Enbridge proposes to provide students and teachers with information on energy in general, and natural gas in particular, including safety, conservation, and greenhouse gas emissions. The offer will provide a unique platform that includes educational awareness and empowers students with the ability to impact gas consumption in their schools and their homes. Through the use of concepts such as Community Based Social Marketing ("CBSM") and competition, this offer will educate students, with an aim to change behaviours. The offer will have five key elements: Education, Behavioral Change, Implementation, Monitoring, and Performance.

Although this is a new undertaking for Enbridge, similar programs have been implemented elsewhere within the Canadian marketplace. Other examples of this type of youth engagement have been employed by both BC Hydro (the Energy Conservation Cup) and by Surrey Schools (Energy Management & Sustainability Programs). Experience with these programs to date has been positive. In the case of Surrey Schools, in its inaugural year, the program was held for only one week of the school year. However, due to high participation it was recognized that a longer, more intensive program could be more successful in changing habits and increasing the persistence of savings. Each year all of the District's 19 secondary schools have participated. The top eight schools achieve savings from 4.3% to 10.9% during the program. Similar to Enbridge's proposal, the program required an Energy Management Information System ("EMIS"), to provide the schools with access to real time data, and a 'points' calculator.

Barriers: Public schools, in particular, face economic challenges and budget constraints, hindering their participation in conservation programs.

Offer Details: Enbridge intends to target all grades with education materials and workshops to build awareness and to begin to influence behavioral modification. In particular, for grades 9 -12 Enbridge will sponsor an annual competition to produce results arising from a combination of operational improvements, behavioral changes, and educational competitions.

To facilitate the offer, Enbridge will employ an EMIS to provide a web-based dashboard that will illustrate a school's gas consumption, their baseline usage prior to enrolling in the competition, and the school's consumption relative to conservation goals. This will allow students to gain a deeper understanding of how their school consumes energy and how their actions can reduce energy consumption. The offer will run from October to March of each school year.

The Competition will have five main elements:

(i) *Education* – An educational component will be developed for grades K-12, following Ontario's Science and Technology curriculum, building on existing materials such as the grade six material called "Generation Conservation" and will be developed for teachers to easily integrate into the classroom. In addition, educational materials will also be developed regarding residential consumption for the students to take home.

(ii) *Behavioural Change* – Community based social marketing ("CBSM") research indicates that goal-setting and providing rewards and community awareness is an effective behaviour change tool. Specific actions and topic areas that will be targeted may include:

- Sweater day – encourage reduction in heating;
- Building envelope – reducing consumption VIA windows/door openings;
- Safety – natural gas safety in schools and homes;
- Water conservation; and,
- Utilization of social media and dashboards to keep students engaged in the competition.

(iii) *Implementation* – Students will be encouraged to complete items on the Implementation Checklist to achieve points within the competition. These

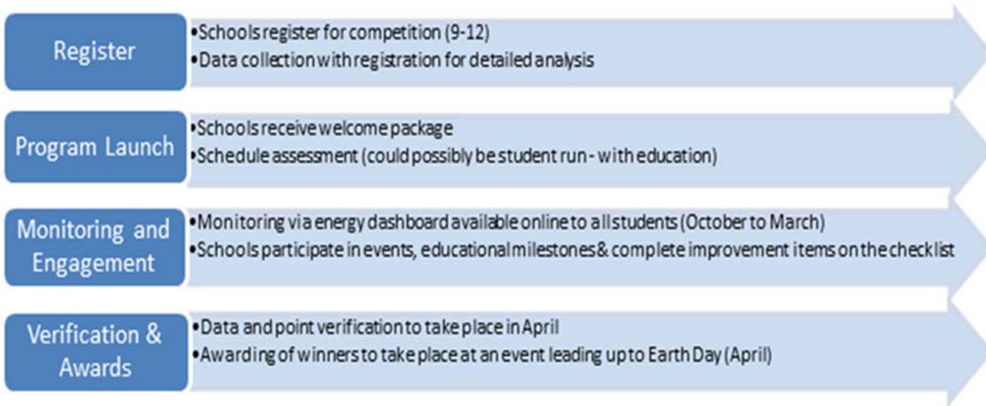
points will be added to their total score to determine a winner. Items on the checklist that produce points for the school can include participation in events such as:

- Participate in or hold an event for World Water Day;
- Replacement of aerators in school;
- Number of participants to implement energy savings in their homes;
- Posters, assemblies, or guest speakers to encourage energy and water conservation;
- Participation in Earth Hour events; and,
- Complete 2 Enbridge workshops/events per year.

(iv) *Monitoring* – Upon registering, schools will receive access to the EMIS dashboard. In addition, meters will be supplied by Enbridge to discretely measure consumption and display media will be placed around the school to provide energy and water saving information, tips, and competition status. Dashboard information will include individual school consumption comparisons to each school's individual historical consumption.

(v) *Performance* – Individual schools will be scored on the implementation of particular elements and educational components of the offer. A specific metric comparing the school's energy savings to its baseline will also be a feature of the final scoring. Schools will also be encouraged to engage in friendly competition with other schools.

The diagram below displays the process steps related to the roll-out of the program:



19. Run it Right

Goal: The goal of the 'Run it Right' ("RiR") offer is to engage medium to large commercial customers and small industrial customers in the pursuit of enhanced energy performance. RiR will drive this outcome through monitoring, measuring, benchmarking, and identification of both retrofit and operational opportunities.

Target Market: This offer is available to customers in the Rate 6, 110, 115, 135, 145, or 170 classes. The target market for this offer includes commercial customers, as well as property managers of large commercial, multi-family and institutional buildings.

Background: The RiR offer is focused on engaging building owners to commit to long term space and water heating energy savings through continuous operational improvements. The offer includes data driven, or "performance based" analysis of current energy use trends, a re-commissioning building tune-up focused on optimization of current equipment, continuous monitoring through an EMIS and reporting of consumption.

The RiR offer was new in 2012 and has continued to evolve since its inception. RiR today is offered to Enbridge customers that have Metretek meters and thus have access to daily consumption through the Enbridge meters. There are approximately 2,500 large volume commercial buildings that currently have (or have capacity to install) Metretek meters which provide daily consumption. In addition, there are another roughly 8,500 Commercial buildings using over 100,000m^3 annually and roughly 2,000 Industrial customers that use less than 300,000m^3 annually that could be targeted for the RiR offer.

The RiR offer is responsive to the DSM Framework, released in December 2014, which highlighted energy management and performance based programs, specifically referencing the use of data to enable customers with information required to make educated decisions[17].

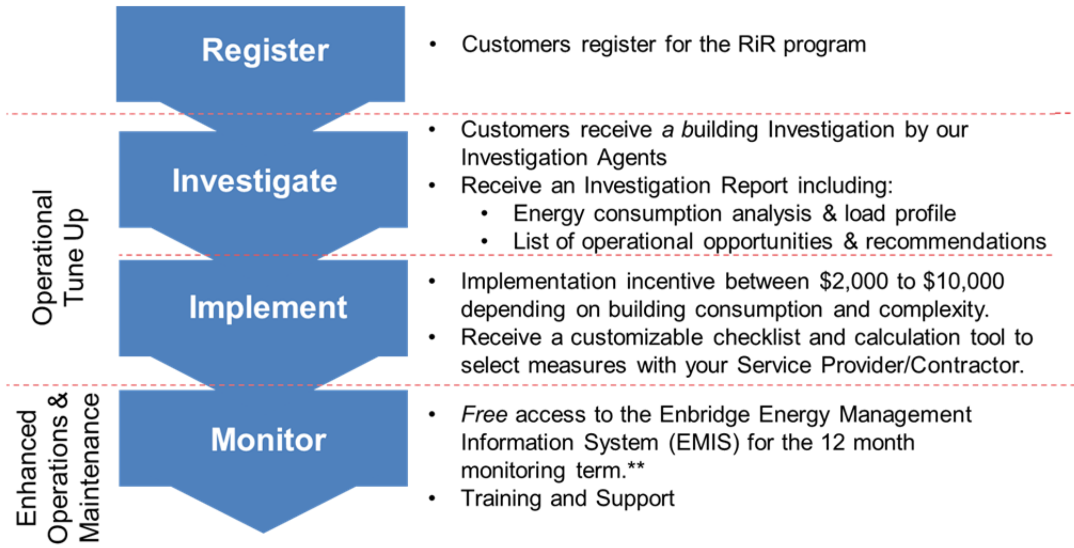
Barriers: RiR still needs to overcome many barriers relating to the knowledge gap that exists for customers and industry service providers in order to transform the marketplace and enable performance based conservation. Some of these barriers include:

- Customers are not aware of all opportunities, or if they are, are not convinced about the magnitude of the potential savings;
- Challenges in quantifying savings while accounting for external factors;

[17] EB-2014-0134 "Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020)" Dec. 22, 2014, p.5, 6

- Energy management is not a core business activity and customers do not have in-house expertise to undertake the required activities;
- Monitoring service providers typically do not offer a complete package of analysis;
- Monitoring services may only be cost effective for a limited type and size of customer;
- Monitoring services do not always provide recommendations for appropriate energy solutions to address excessive consumption;
- Re-commissioning agents tend to have either limited analytical services or limited interest in continuous monitoring and sustained energy savings;
- Energy profiling is often undertaken by vendors whose financial interest is in selling capital improvements rather than operational improvements; and,
- Utilities have traditionally not been viewed as energy partners by commercial sector customers for the operations of their buildings.

Offer Details: While larger volume buildings will yield greater gas savings resulting from operational improvements, a large proportion of smaller commercial and industrial customers can benefit from the RiR offer. The RiR offer consists of the following process elements:



The RiR offer will target buildings with either a Metretek meter or buildings where Enbridge can access daily consumption. Customers will be offered a free assessment of their building, followed by a list of recommended measures that can be implemented to reduce energy consumption. Enbridge will provide an incentive to offset the cost of implementation. RiR participants will have access to analysis through an EMIS to discern savings opportunities and to move towards data driven decisions.

Incentives will be determined according to the consumption and complexity of facility operations. Consumption ranges have been established and the average savings for each range are calculated based on normalized building consumption data for 2011-2013. The 3-year normalized (2011-2013) average consumption data will be used to determine the building's re-commissioning implementation incentive tier in combination with building class according to complexity by sector. Complex facilities typically include: industrial facilities, universities, and hospitals with multiple systems. Moderately complex facilities include: offices, municipalities, large offices, large retail (malls), hotels, and multi-residential with multiple systems. Simple facilities typically include: multi-residential, retail, long term care, elementary schools, restaurants, and warehouses.

The table below summarizes the proposed incentives for the RiR offer:

Annual Normalized Gas Consumption (m^3)	Complex	Moderately Complex	Simple
> 1,000,000	$10,000	$7,500	$5,500
500,000 - 999,999	$7,000	$5,500	$4,500
300,000 - 499,999	$6,000	$4,500	$3,500
0 - 299,999	$5,000	$3,500	$2,500

In 2016, Enbridge plans to explore the viability of using a reduced monitoring period with consideration for an appropriate level of rigour.

20. Small Commercial & Industrial Behavioural

Goal: The goal of this offer is to inform and educate Enbridge's customers through a behavioural initiative that leverages data analytics and communications with the ultimate goal of delivering energy savings. The aim is to broaden education and awareness, and to facilitate behavioural changes in customers' activity to drive reduced natural gas consumption.

Target Market: This offer is targeted to small volume customers in Rates 6, 110, 115, 135, and 145. Enbridge currently has approximately 148,000 small commercial and industrial customers who consume less than 100,000 m^3 annually.

Background: Historically, the success of commercial and industrial DSM has largely been driven by deepening engagement with a small set of large volume customers. Enbridge has had much lower DSM participation from small commercial and industrial customers, in large part because programs in the past have been challenged to overcome this customer segment's particularly high barriers to adoption. In particular, this customer segment has not responded well to traditional Resource Acquisition retrofit activity in part because of the high costs of capital equipment relative to overall operations, and smaller natural gas savings per install. In addition, prescriptive programs alone are not enough to fill this gap because as technology continues to advance, and costs rise, there may be a diminishing return on investment for prescriptive savings. Stated differently, the incremental improvements for prescriptive savings decline as technology continues to progress. Enbridge believes there is an opportunity for a different approach aimed at educating and influencing energy efficiency in a more 'mass market' approach.

This offer has the potential to become a cost-effective mechanism for the Company to achieve many goals simultaneously:

- Driving participants to participate in other DSM/CDM programs;
- Reaching a broader customer audience;
- Enhancing customer experience; and,
- Promotion of energy literacy on a broad scale.

Barriers: Enbridge is looking to bring this offer to market as a pilot project in 2016. To date, the small commercial segment has had very little historical participation with commercial DSM, which can be attributed to several factors:

- Lack of awareness of offers and services available;
- Limited time or resources to devote to energy conservation;
- Energy conservation is a low priority;
- Business and/or tenant turnover; and,
- High cost of retrofit activity.

Offer Details: The offer will be similar in nature to Enbridge's My Home Health Record and will begin by establishing a control group of approximately 7,500 customers and a test group of approximately 7,500 customers that will be selected based on consumption. A specific set of customers will be randomly targeted and put into one of the two groups. Once the two groups are established, the test group will receive 3-4 reports over the heating season, detailing the customer's consumption relative to similar facilities in order to elicit a shift in behaviour towards energy efficiency. Customers in the test group will have the option to "opt-out" of the offer. In addition to providing a comparative view of consumption for the customer, this platform will be used to:

- Present the customer with individually tailored tips based on the customer's load profile that will help the customer to achieve reductions in consumption;
- Direct the customer to specific DSM / CDM programs that may be of interest; and,

- Provide relevant information about equipment and energy consumption, as well as available incentives and services.

Customers will also be provided with access to a web portal so that participants can learn more about their consumption and access this information online using a customer friendly interface. In addition, intermittent email reminders will be used to keep customers engaged in the offer.

21. Comprehensive Energy Management

Goal: Enbridge's Comprehensive, or Strategic, Energy Management ("CEM") offer will help customers reduce operational costs by presenting energy as a controllable input cost, and seek to create a sustainable culture of energy efficiency. This offer intends to build and expand on the Company's existing industrial offers to guide and help customers with a structured approach to identifying, quantifying and implementing energy efficient measures.

Target Market: The CEM offer is targeted to large commercial and industrial consumers in the rate classes 6, 110, 115, 135, 145, and 170.

The primary target market will be composed of industrial customers whose annual gas consumption is between 340,000 m^3 and 5,000,000 m^3. Larger commercial customers may also be enrolled in this offer. Enbridge intends to work with approximately 75 customers over a five year period.

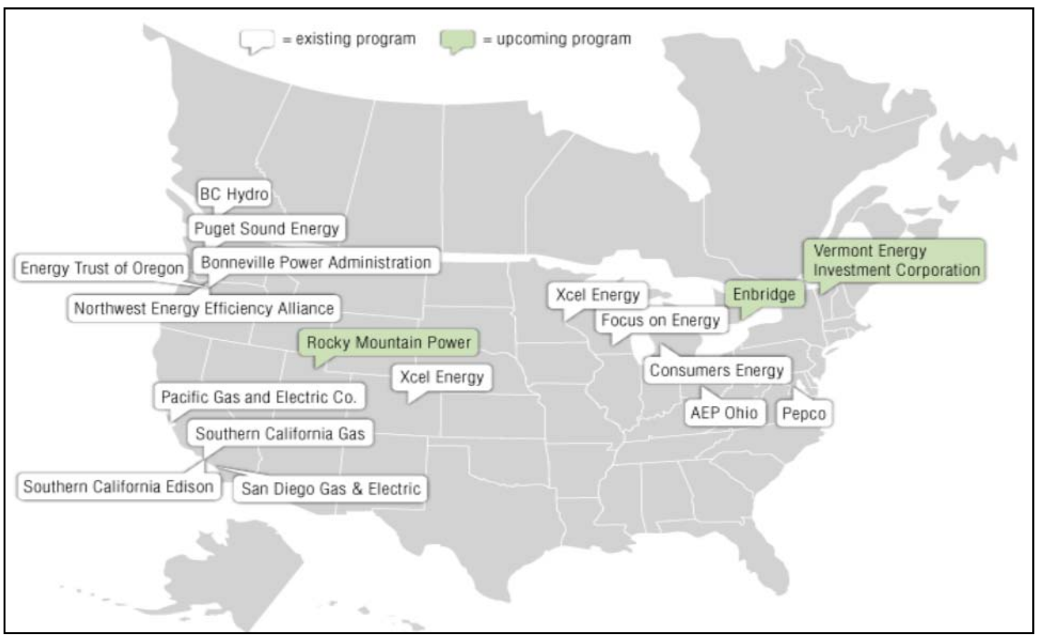
Background: CEM will provide a structured process to energy management, where customers are taken through a holistic and systematic approach, with the end goal of creating a corporate culture shift. The CEM offer aims to act as a driving force to identify and implement a diversified set of practices such as operational, managerial, organizational, cultural, behavioural, educational, process system optimization and continuous improvement, to institutionalize long-term energy savings, in addition to identifying equipment retrofit opportunities.

The industrial manufacturing sector is a complex sector, with specific characteristics which require a tailored approach to meet customer needs. The most predominant characteristics of the industrial manufacturing sector are:

- Manufacturing is Complex and Sophisticated – understanding energy use patterns in manufacturing plants can be more complex than for other sectors;
- Manufacturing is Diverse – The industrial sector is comprised of a wide variety of different industry subsectors with different production processes and energy use characteristics. Even within subsectors, processes, product mix output, and energy use patterns vary substantially;
- Decision Making – Energy efficiency is often not integrated into a Company's decision making process for several reasons:
    - Energy efficiency projects may compete with core business investments that dominate attention, as well as investments for safety, environmental or other requirements;
    - Decision-making is often split across business units;
    - The skills required to identify and pursue energy efficiency opportunities are not always present.

- o Operational Cycles Influence Investment Decisions – Energy efficiency investments are heavily dependent on the industrial customer's operational cycle, which can span four to seven years on average.

Other jurisdictions throughout North America have recognized the value of similar undertakings to drive deeper energy efficiency through cultural changes. ESource has identified 14 existing strategic energy management programs in North America, and three others that are in development. These are illustrated in the following diagram: [18]



[18] Strategic Energy Management Programs: Tapping Large Customers for Deep and Continuous Energy Savings, Kate Drexler, Published: September 9, 2013 | Focus Report | DSM-F-3

Barriers: The CEM offer aims to address the following barriers to help customers increase the profile of energy efficiency:

- Knowledge barriers – customers often do not have the technical experience or knowledge to apply a structured approach to identify the opportunity areas for energy efficiency;
- Financial barriers – Not understanding or knowing what the costs or financial returns will be in undertaking a review of their energy consumption opportunities, customers are unlikely to begin this effort independently;
- Cultural barriers – Energy efficiency competes with other capital investments which may be viewed by a customer's management as more important.

Offer Details: Enbridge intends to introduce CEM in 2015 as a pilot, and proceed on a larger scale in 2016. As a facilitator and educator, Enbridge will lead, assist, guide, educate and support customers through the inception and execution of each actionable item of the offer by working with customers through a set of tools, guidelines, resources and technical expertise.

By participating in the offer, customers will be required to undertake the following commitments:

- Make energy usage a specific performance goal;
- Provide resources to follow through with energy management;
- Create energy or sustainability teams (at least one dedicated energy manager or champion who allocates some time towards energy efficiency activities);
- Demonstrate commitment to improve operations and maintenance practices;

- Be willing to invest in enabling EMIS elements (Sub-meters, Hardware / Software) to better control and manage their energy; and,
- Be willing to participate in training.

Enbridge is proposing four types of financial incentives, as follows:

1. Funds to offset the cost of monitoring systems:

Monitoring Systems Enabler EMIS Elements Incentive	
80% of eligible costs to a maximum of $100,000 depending on the annual gas consumption	
• 0.3M to 0.5M m^3	$ 40,000
• 0.5M to 1.0M m^3	$ 60,000
• 1.0M to 1.5M m^3	$ 70,000
• 1.5M to 5.0M m^3	$ 80,000
• 5.0M to 10.0M m^3	$ 90,000
• > 10.0M m^3	$100,000

2. Incentives for cubic meters saved and verified through behavioral activities:

Cubic Meters Verified Savings Incentives
$0.30/ m^3 per cubic meter saved up to $100,000 per project (Incentives cannot exceed 50% of the cost)

The savings will be determined and calculated as the difference from a baseline. After the savings are verified and recognized through an incentive, the baseline will be redefined based on the improved performance.

3. Incentives for specific energy efficiency project investments:

   The financial incentives associated with the Custom Industrial offer will be applied as a part of the Enbridge Industrial CEM offer where capital measures are identified and implemented. This incentive is designed to encourage implementation of identified capital project opportunities. Incentives will be quantified through the Custom engineering calculation at the time of opportunity identification.

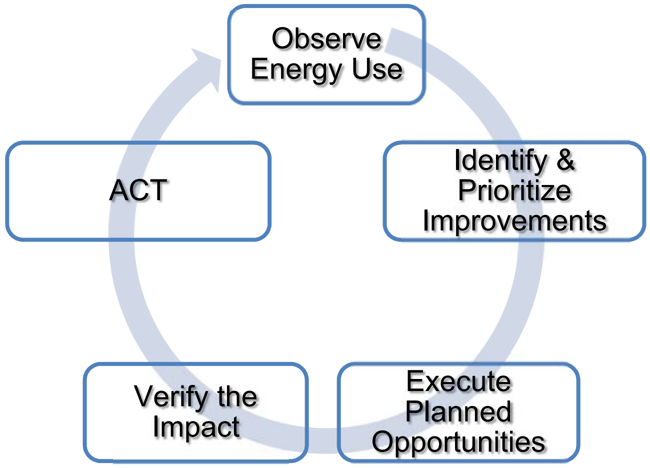
4. Funds to promote energy awareness and encourage energy efficiency training:

   In order to help customers maintain momentum in implementing energy saving initiatives, creating a culture of energy efficiency and also promoting persistence and a continuous improvement cycle, customers may be qualified for an incentive of up to $10,000 per participant to help promote and sustain energy awareness across the organization.

The schematic below describes the process that will be used to enact the offer. The main steps in the process will include:

1. Quantifying energy use and identifying opportunities
2. Planning and analyzing data and opportunities
3. Developing strategies to implement the savings opportunities
4. Verifying the results
5. Establishing improved standard operating practices incorporating those outcomes.

The CEM Process



22. Energy Literacy

In addition to Enbridge's suite of programs and offers, Enbridge will create a specific focus to broadly increase energy literacy.

Goal: Continuous customer education and engagement must be a component of DSM program plans and outreach on a broader scale to the marketplace.

Target Market: The target market for this offer includes all rate classes in the Enbridge franchise territory excluding Rate 125.

Background: Beginning in 1995 with a directive from the Ontario Energy Board (OEB), (EB 169), Enbridge has provided programs to help customers reduce their demand for natural gas. Enbridge has saved over 8.8 billion cubic meters (m^3) of natural gas through its DSM programs. Those savings have been derived primarily through specific resource acquisition and low income programs to customers with marketing, and messaging specific only to that offer. Enbridge believes that in order to promote a broader Culture of Conservation in collaboration with the electric utilities in Ontario, an overarching natural gas oriented energy literacy campaign will be highly beneficial. To understand the Company's starting point, a description of Energy Literacy and an 'energy literate' person may be helpful:

> Energy Literacy is an understanding of the nature and role of energy in the world and daily lives accompanied by the ability to apply this understanding to answer questions and solve problems.[19]

An energy-literate person:

- Can trace energy flows and think in terms of energy systems.
- Knows how much energy they use, for what purpose, and where the energy comes from.
- Can assess the credibility of information about energy.
- Can communicate about energy and energy use in meaningful ways.
- Is able to make informed energy use decisions based on an understanding of impacts and consequences[20].

Once a person is energy literate, the belief holds that such a person would make better choices in managing his or her resources, and would use his or her energy more efficiently. As noted by the Canadian Centre for Energy Information:

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[19] http/energy.gov. Energy Literacy: Essential Principles and Fundamental Concepts for Energy Education
[20] http/energy.gov. Energy Literacy: Essential Principles and Fundamental Concepts for Energy Education

> An informed public better understands and supports energy policy and regulatory choices, makes better business decisions related to energy, chooses careers in energy, invests in energy and uses energy wisely.[21]

The missing piece in Enbridge's overarching strategy to producing energy efficiency results is energy literacy. The pursuit of energy literacy in this Multi-Year DSM Plan, although not directly responsible for producing results, should better enable the Company's DSM programming as articulated in Canada's Energy Strategy Framework.

> Energy literacy opens up tremendous opportunities for more sophisticated communications and more effective programming to inform consumer decision-making about energy use, and ultimately to enable an energy conserving society.[22]

Offer Details: Enbridge will work during the remainder of 2015 and throughout 2016 to develop, in consultation with stakeholders, initiatives to support energy literacy to better facilitate energy efficiency and conservation.
Examples of the types of ideas that could be explored are:

1) Leveraging the SaveOnEnergy brand and marketing investments made by the electricity sector in Ontario. Work on this has already started with Enbridge actively engaged on the Conservation First Implementation Committee and related marketing subcommittee.

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[21] Energy Policy Institute of Canada (August 2012) *A Canadian Energy Strategy*, p. 67. Accessed March 1, 2015: http://www.canadasenergy.ca/wp-content/uploads/2012/08/Final-Document-Aug-1.pdf
[22] Energy Policy Institute of Canada (February 2012) *A Canadian Energy Strategy Feedback Conference*, p. 22. Accessed March 1, 2015: http://www.canadasenergy.ca/wp-content/uploads/2012/02/Agenda-and-Documents.pdf

2) Interactive energy literacy and awareness modules that could be located in shopping malls and other public spaces. One excellent example is the "Condo Cube" by BC Hydro PowerSmart. The Power Smart Cube condos have live-in actors and feature glass walls, allowing commuters and shoppers to look into the cubes to learn how to live and work more efficiently.
3) An interactive video game targeted at young adults which makes learning about energy efficiency fun and informative…. maybe even cool.

Education can transform human behaviour towards energy use and increase energy literacy and awareness. Changing energy efficient behaviour and attitudes in our province is something that cannot be done overnight. Indeed, achieving change in energy efficiency behaviours will require understanding behavioural drivers in order to translate this knowledge into a successful energy literacy campaign.

When a campaign is determined, an appropriate corresponding evaluation and review can be undertaken.

EVALUATION PLAN

Introduction

1. As part of its DSM activities, Enbridge has been actively engaged in monitoring, evaluating and verifying its program results for the past 20 years. During that period the Company's evaluation and audit rigor has increased and been informed by best in class practices and procedures.

2015 Transition Year

2. As per section 15.1 of the Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015 to 2020) ("DSM Framework") Enbridge shall be treating the 2015 DSM program year as a Transition Year. The offer evaluation plans applicable to 2015 are available in EB-2011-0295, at Exhibit B, Tab 1, Schedule 5.

Evaluation Plan

3. Currently the main components considered in Enbridge's Evaluation Plan and future implementation include:

   i) Evaluation Projects and Research – Outlines the research and evaluation priorities annually or for the duration of a term which may cover items such as net-to-gross studies (free rider net of spillover is net-to-gross), assessment of offer-related market and market operations (e.g. potential studies, market intelligence gathering), program impacts (e.g. base case assessment and persistence, resource savings, etc.) and program cost-effectiveness (e.g., TRC and PAC).

   ii) Technical Reference Manual – The Technical Reference Manual ("TRM") is a guidance document containing the measures and related inputs, including

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resource savings values, incremental costs, measure lives, etc. Enbridge and Union are currently working in consultation with the TEC towards completion of the TRM which is projected to be finalized in Q2 2015. Moving forward, the Board has indicated an intent to assume a greater role in the updating of input assumptions.

iii) Offer Evaluation Plans – Offer Evaluation Plans are a component of the Evaluation Plan and accompany Enbridge's respective program offers. They provide a systematic and objective plan to review how well a program offer has achieved its intended goals, and how it might improve design and deployment moving forward for enhanced customer satisfaction, results achievement and/or resource efficiency.

iv) Verification Studies – Verification studies are conducted by 3rd party experts to ensure reasonableness of the Company's savings claims.

4. On an annual basis, Enbridge prepares a Draft Evaluation Report, which documents all of the actual results and related spend from the recently completed year. Enbridge's results are then audited by a 3rd party with input from Intervenors and the Company. Enbridge understands that under the Framework, the Board intends to engage the Auditor in or around October and that the Auditor will in turn engage the CPSV firm(s) to undertake the Verification Studies. The results finalized through each annual audit are prepared for review by Stakeholders and the Board, with the Draft Evaluation Report updated to produce an Annual Report. The Annual Report, together with the Auditor's Report, are filed as part of the annual application for approval and clearance of amounts recorded in the several DSM deferral and variance accounts.

5. The Framework at Section 7.2 states that:

> The Board is of the view that it is in the best position to coordinate the evaluation process throughout the DSM framework period (i.e., 2015 to 2020). A process coordinated by the Board, in collaboration with the gas utilities, and supported by

> stakeholders with technical expertise, will be one that results in a thorough evaluation of DSM programs in an efficient manner.

Enbridge understands that further guidance from the Board in this respect is likely in the next several months.

6. Further, the Board states at page 16 of the Filing Guidelines to the Framework:

> The Board will set out the specific roles and responsibilities for the parties involved in the different steps of the evaluation and audit process in a future correspondence.

7. While the Company is cognizant of the Board's intentions to provide further guidance on the evaluation process, Enbridge sets out in this exhibit its Offer Evaluation Plans which the Company will follow over the years 2016 to 2020 of its Multi-Year DSM Plan. The Offer Evaluations Plans will operate contemporaneously with the evaluation process ultimately approved by the Board. In accordance with the reference below from the Framework Filing Guidelines (Section 7.1.3, page 19), the Offer Evaluation Plans have been guided by the IESO's EM&V protocols.

> All program result evaluations will be conducted by the Board's third-party evaluator(s). The third-party evaluators will follow the Ontario Power Authority's ("OPA") [now the IESO] protocols, where applicable and relevant to the natural gas sector.

8. The Annual Evaluation Report and Evaluation Plan will address the elements requested by the Board on page 16 and 17 of the Framework Filing Guidelines. Other elements of Enbridge's filing and future activities will also address the elements requested by the Board and have been identified in the mapping table on the next page for clarity.

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Table 1 – Mapping of Evaluation Elements in this Multi-Year Plan

Board Identified Evaluation Elements to Address	Maps to	Addressed by Enbridge's Plan (in other Exhibits or future outputs)
Key program evaluation metrics	—>	Exhibit B-1-4 Budgets, Targets and Metrics and in the Offer Evaluation Plans
Natural gas savings and other resource savings	—>	Exhibit B-2-5 Avoided Costs, end of year Annual Evaluation Report
Results for each of the metrics on the program scorecard(s)	—>	Results will be captured in the Annual Evaluation Report, and upon audit/finalization in the Annual Report
Net Equipment and Program Costs	—>	Exhibit B-2-6 Updated Inputs and Assumptions and in the Offer Evaluation Plans in the Evaluation Exhibit B-2-2
Cost-effectiveness results	—>	Exhibit B-2-3 TRC plus and PACt Analysis
Monitoring and collecting other relevant information	—>	Exhibit B-2-2 Evaluation Plan (in the specific Offer Evaluation Plans)
Informing decisions regarding LRAM and shareholder incentive amounts	—>	Exhibit B-2-4 Rate Allocation
Providing ongoing feedback, and corrective and constructive guidance regarding the implementation of programs	—>	Exhibit B-2-2 Evaluation Plan (in the specific Offer Evaluation Plans), Exhibit B-3-1 Prospective Stakeholdering, Exhibit B-3-2 Retrospective Stakeholdering, out of the Auditor's Report and related dialogues with the Audit Committee, Consultative sessions, through evaluation projects, and through ongoing research and jurisdictional scans.
Assess whether there is a continuing need for the program and, if so, whether it should be expanded, reduced or maintained at the same scale	—>	Exhibit B-2-3 TRC plus and PACt, Exhibit B-2-2 Evaluation Plan, Exh-B-3-1 Prospective Stakeholdering (in particular customer feedback) out of the Audit Report and related dialogues with the Audit Committee, Consultative sessions, through evaluation projects, and through ongoing research.

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2016 to 2020 Estimated Process and Impact Evaluation Budget

Program/ Category	2016	2017	2018	2019	2020
Resource Acquisition					
Residential	$ 220,000	$ 260,000	$ 260,000	$ 265,620	$ 271,352
Commercial	$ 290,000	$ 330,000	$ 330,000	$ 337,133	$ 344,409
Industrial	$ 170,000	$ 210,000	$ 210,000	$ 214,539	$ 219,169
Low Income	$ 105,000	$ 145,000	$ 145,000	$ 148,134	$ 151,331
Market Transformation and Energy Management	$ 100,000	$ 120,000	$ 120,000	$ 122,594	$ 125,240
Audit (including Audit Committee)	$ 215,000	$ 215,000	$ 215,000	$ 219,647	$ 224,388
Joint Evaluation Research	$ 150,000	$ 170,000	$ 170,000	$ 173,675	$ 177,423
Evaluation Stakeholdering and Expert Advice and DSM Consultative	$ 250,000	$ 250,000	$ 250,000	$ 255,404	$ 260,916
Grand Total	**$ 1,500,000**	**$ 1,700,000**	**$ 1,700,000**	**$ 1,736,746**	**$ 1,774,228**

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Offer Evaluation Plan (2016-2020) Custom Industrial Resource Acquisition

OFFER OVERVIEW	**Offer Description:** This offer involves ESCs working directly with industrial customers to develop a custom solution that meets their production, energy efficiency and budgetary needs. The offer also includes both enabling support services and implementation incentives. The following is a list of typical enabling support services an ESC would conduct in the development of a custom solution: • Walk through audits; • Scope of work definition for third party vendors or service providers; • Data gathering, consultation testing, flow measurement, etc. • Engineering calculations; • Vendor liaison; • Custom incentive. **Goals and Objectives:** The primary objectives of this offer include: • Increasing adoption of energy efficiency technologies among all industrial customers; • Assisting customers in overcoming financial, knowledge and technical barriers to adopting energy efficiency technologies; • Helping customers by enhancing the return on investment of projects; • Maximizing the energy savings potential for the industrial sector; • Provide engineering and business support services and financial incentives to help customers meet production, energy efficiency and budgetary needs. **Target Market:** • Targets industrial customers in the following rate classes: Rate 6, 110, 115, 135, 145, and 170. **Eligibility Requirements:** • Industrial customers within Enbridge's • Enbridge's franchise area in the above rate classes. **Key Offer Elements:** Given the wide variety and uniqueness of industrial customers' business and technical needs, the most appropriate method of addressing these customers' energy efficiency goals is often a customized approach.

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1. Knowledge Development	Enbridge makes a variety of technical publications and quarterly updates available to customers at no charge, in addition to in-person workshops to give customers the information they need to make informed decisions.
2. Opportunity Identification	Energy Solutions Consultants (ESCs) and technical experts provide a variety of services to help our customers identify efficiency opportunities, some of which include plant and equipment testing as well as assessments and thermal imaging.
3. Measurement	Enbridge will continue to help customers select the appropriate means of measurement and quantify key energy inputs.
4. Engineering Analysis	This valuable analysis serves as the basis for calculating energy losses and comparing various energy efficiency options.
5. Implementation Planning	Enbridge will work with customers to develop an implementation plan and connect customers with relevant business partners.

In addition to these services, this offer also provides customers with financial incentives to help them offset the cost of energy saving initiatives.

In an effort to better align incentives to ensure that small and medium industrial customers benefit from larger incentives, the incentive structure was modified in 2014 to a tiered approach that will continue in 2016 and beyond.

Monetary support serves to offset a portion of customers' capital costs associated with energy efficiency projects. The incentive structure is as follows:

For customers with annual consumption > 340,000 m^3:
- $0.10/ m^3 for industrial custom projects for estimated savings;
- This incentive cannot exceed 50% of the project cost, to a maximum of $100,000 per project.

For customers with annual consumption < 340,000 m^3:
- 0.30/ m^3 for industrial custom projects for verified savings;
- This incentive cannot exceed 50% of the project cost, to a maximum of $100,000 per project.

Offer Timing:
The offer is a continuation of the 2015 offer with revised incentives as described above. The offer is expected to continue throughout the 2016-2020 plan.

Estimated Participation:
See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets

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	Offer Theory: Provide industrial customers with a flexible energy efficiency offer to develop customized solutions to achieve higher levels of energy and environmental performance. Barriers: There are a number of key barriers to the adoption of energy efficiency in the industrial sector, including: • Knowledge barriers – provide customers with information they need to make informed decisions to identify, quantify and justify the opportunities through technical advice and expertise; • Technical barriers – help customers by informing them and presenting them with alternatives, and ultimately select the right solution as well as the methodology to quantify key energy inputs; and • Financial barriers – provide customers with incentives to help them improve return on investment (ROI) for energy efficiency initiatives. The industrial custom offer is designed to address these barriers to participation by providing a comprehensive suite of support activities: • Education and awareness of potential savings opportunities and identifying and implementing potential energy savings; • Expansion into segments focusing on small to medium sized customers and the development of related channel strategies. •
EVALUATION GOALS AND OBJECTIVES	**Key Offer Evaluation Metrics:** Cubic Cumulative Meters (CCM) • Verify savings through the CPSV review process and conduct internal review of savings to reflect appropriate engineering reviews and related studies; • Establish appropriate tracking and reporting criteria; and • Inform current and long-term program planning and implementation. **Research Questions**: • Are the incentives at the appropriate level for effective engagement of the market? • How effective are the new tiered incentives in securing greater participation? • Are there LDC programs that can be leveraged?
EVALUATION APPROACH	**Impact Evaluation:** • Ensure accurate tracking of the offer participants. Ensure project files are complete, accurate, and substantiated.

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	• An engineering firm will be contracted to conduct the Custom Projects Savings Verification (CPSV). **Process Evaluation:** • Survey participants to determine effectiveness of incentives and offer delivery. **Evaluation Dependencies:** • Site verifications require access to customer facilities.
DATA COLLECTION RESPONSIBILITIES	• Utilize the Company's current results tracking mechanisms. • Complete custom project files with supporting documentation (e.g. customer information, technology, estimated savings calculations, and participant incentive).

Witnesses: D. Bullock
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Offer Evaluation Plan (2016 to 2020) Custom Commercial Resource Acquisition

<table>
<tr>
<td>OFFER OVERVIEW</td>
<td>
Offer Description:
The offer provides technical assistance and financial incentives aimed at encouraging existing commercial customers to implement energy efficient technologies. It consists of variable incentives based on project specific details wherein custom calculations are used to estimate the savings. The incentive is calculated based on a range of $.10-.30/m³ of gas saved.
Goals and Objectives:
Provides engineering and business support services and financial incentives to help customers meet energy efficiency and budgetary goals.
Target Market:
Targets commercial customers in the following rate classes: Rate 6, 110, 115, 135, 145, and 170.
Eligibility Requirements:
Commercial customers within Enbridge's franchise area in the above rate classes.
Key Offer Elements:
The central component of the Custom offer is the consultative services that Enbridge provides to customers, assessing building energy consumption, evaluating recommendations by 3rd party service providers, and making recommendations for gas-saving measures and providing an incentive based on the annual gas savings. Historically, the Custom offer has included a straight $0.10/m³, to a maximum of 50% of the project cost, or $100,000 per customer per year. Beginning in 2016, Enbridge will implement an increased, and tiered Commercial Custom incentive structure as described below:
<table>
<tr><th>Percentage of annual consumption (m³) saved</th><th>$/m³ Incentive</th></tr>
<tr><td>0-10%</td><td>$0.10/m³</td></tr>
<tr><td>10-20%</td><td>$0.20/m³</td></tr>
<tr><td>20% and above</td><td>$0.30/m³</td></tr>
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The maximum incentive levels will be capped at 50% of the project's capital cost (before tax) and/or $100,000 per customer per year.
The revised tiered incentive structure is intended to drive a greater uptake of projects that yield deep savings (above 20% of annual consumption). The higher incentives for these projects will encourage the adoption of additional efficiency measures
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	and/or the installation of the most efficient equipment possible to achieve the highest level. From the customer's perspective, a higher incentive helps offset the capital equipment cost and efficiency measures, and makes the project(s) more attractive to implement. Enbridge may consider time-limited or enhanced incentives focused on specific opportunities, either technology-based or sector-based. Corresponding marketing and outreach efforts are made to support such campaigns. The offer is delivered by Enbridge's Energy Solutions Consultants (ESCs), who work directly with customers, engineering firms, distributors and contractors. Offer Timing: The offer is a continuation of the 2015 offer with new incentives as described above. It will continue throughout the 2016-2020 plan. Estimated Participation: See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets Offer Theory: Provide existing commercial customers with a variety of energy efficiency focused support activities aimed at achieving higher levels of energy and environmental performance. Barriers: There are a number of key barriers to the adoption of energy efficiency in the commercial sector. These include: • Lack of funding for capital and operational measures; preference to more attractive electrical incentives; • Uncertainty of savings or ROI below customer's threshold; • Lack of time and conflicting priorities; • Property owned by others (split incentive); and • Lack of technical expertise and offer awareness. The commercial sector custom offer is designed to address these barriers to participation by providing a comprehensive suite of support activities: • Education and awareness of potential savings opportunities and identifying and implementing potential energy savings • Expansion into new segments and develop channel strategies • Access to incentives, including larger incentives for larger savings
EVALUATION GOALS AND OBJECTIVES	**Key Offer Evaluation Metrics:** Cubic Cumulative Meters (CCM) • Verify savings per the engineering review process and conduct internal review of offer operations; • Ensure savings reflect appropriate engineering reviews and related studies;

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	• Establish appropriate tracking and reporting criteria; and • Inform current and long-term planning and implementation. **Research Questions**: • Are the incentives at the appropriate level for effective engagement of the market? • How effective are the new tiered incentives in securing greater participation? • Are there LDC programs that can be leveraged?
EVALUATION APPROACH	**Impact Evaluation:** • Ensure accurate tracking of the offer participants. Ensure project files are complete, accurate, and substantiated; • An engineering firm will be contracted to conduct the Custom Projects Savings Verification (CPSV). **Process Evaluation:** • Survey participants to determine effectiveness of incentives and offer delivery; • Survey contractors to determine effectiveness of incentives. **Evaluation Dependencies:** • Site verifications require access to customer facilities.
DATA COLLECTION RESPONSIBILITIES	• Utilize the Company's current results tracking mechanisms; • Complete Custom project files with supporting documentation (e.g. customer information, measures installed, estimated savings and calculations, and participant incentive).

Witnesses: D. Bullock
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Offer Evaluation Plan (2016 to 2020) Commercial & Industrial Direct
Install Resource Acquisition

OFFER OVERVIEW	**Offer Description:** The Direct Install offer is a "turnkey" solution that makes it easy and affordable for customers to upgrade their energy efficiency. Enbridge and its selected contractors will assist customers in their decision making processes, beginning with an assessment of the customer's current equipment and concluding with the installation of all eligible efficient equipment. **Goals and Objectives:** The goal of this offer is to effectively reach the traditionally underserved small to mid-size commercial and small industrial customers. The offer, which is applied to specific, specialized technologies, intends to extend the reach of DSM activity beyond simple prescriptive measures to a place that is not as labour intensive as a full custom retrofit. **Target Market:** • This offer is intended for small to mid-size commercial and small industrial customers in rates 6, 110, 115, 135, and 145. **Eligibility Requirements:** • Existing customers (buildings) in the Enbridge franchise area using natural gas. **Key Offer Elements:** Enbridge and its selected contractors will assist customers in their decision making process, beginning with an assessment of the customer's current equipment and concluding with the installation of all eligible efficient equipment. Through the Direct Install offer, Enbridge will cover 50% of the cost of the equipment and installation for air doors, infrared heaters, and demand control kitchen ventilation and 100% of the cost of Pre-Rinse Spray Valves. Going forward, Enbridge may add specific technologies to the Direct Install offer as demand, budget, and technologies permit. The following are brief descriptions of the technologies that may be included in the Direct Install offer: • Air Doors; • Pre-Rinse Spray Valves (PRSV); • Infrared Heaters; • Demand Control Kitchen Ventilation (DCKV). **Offer Timing:** This offer will commence in 2016 and is expected to continue through to 2020.

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	Estimated Participation: See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets **Offer Theory:** The Direct Install offer is a new component to the DSM portfolio and is expected to be a key vehicle in engaging market segments that have had little historical participation with DSM programs, and are typically difficult to reach. With this offer, customers will be able to receive new efficient equipment at no cost / low cost which will yield immediate benefits, most notably gas savings and longer equipment life, as well as free consultation on their equipment and gas consumption. The offer provides a vehicle for Enbridge to better engage with this significant customer base, and build customer rapport and awareness of Enbridge's DSM offers and services. Barriers: There are a number of key barriers to the adoption of energy efficiency in the small to mid-size commercial and small industrial sectors. Some of the attributes relevant for small commercial customers also are relevant for mid-size commercial customers, and include: • All energy bills as a relatively small portion of total operation costs; • rent building space; • relatively high turnover rates; • primary focus on revenues and not on costs; • low awareness of DSM technologies; • high value on time; and • many competing options for investment funds. The Direct Install offer is designed to address these barriers to participation by providing a comprehensive suite of support activities: • Education and awareness of potential savings opportunities and identifying and implementing potential energy savings; • Faster and easier access to incentives; and • Facilitating implementation of measures.
EVALUATION GOALS AND OBJECTIVES	**Key Offer Evaluation Metrics:** CCM • Establish appropriate tracking and reporting criteria. • Assess effectiveness of proposed delivery methodology including uptake by delivery partners. **Research Questions**: • How effective is the delivery approach? • Are the incentives at the appropriate level for effective engagement of the market for each of the measures?

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	• What were the observed installation rates of the measures for customers who participated in the offer? • Are there LDC programs that can be leveraged?
EVALUATION APPROACH	**Impact Evaluation:** • Ensure accurate tracking of the offer participants and measures installed. • On-site verification of installation for applicable measures. **Process Evaluation:** • Survey participants to determine effectiveness of incentives and offer delivery specifics. • Survey contractors to determine effectiveness of incentives and offer delivery specifics. **Evaluation Dependencies:** • Site verifications would require access to customer facilities.
DATA COLLECTION RESPONSIBILITIES	Data submissions to be provided to Enbridge by a contractor as part of incentive/rebate processing. Data may include: • Customer Information • Installation Address • Technology (make, model, serial # if required, and units installed) • Invoice for proof of purchase/installation • Contractor Information • Existing HVAC equipment

Witnesses: D. Bullock
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Offer Evaluation Plan (2016 to 2020) Commercial & Industrial Prescriptive (Fixed) Incentive Resource Acquisition

OFFER OVERVIEW	**Offer Description:** The Prescriptive offer is an important contributor to the Company's DSM programming activities. A range of prescriptive incentives are offered to Enbridge customers to encourage the purchase and installation of energy efficient equipment that will yield natural gas savings. **Goals and Objectives:** The goal of the Prescriptive offer is to reduce natural gas use through the capture of cost effective energy efficiency opportunities in new and existing commercial and industrial sector buildings. **Target Market:** • Commercial and industrial customers (more likely to participate in a prescriptive offer) in the following rates classes: Rates 6, 110, 115, 135, and 145. **Eligibility Requirements:** • Existing customers (buildings) in the Enbridge franchise area using natural gas. **Key Offer Elements:** The Prescriptive offer is attractive to customers in that they are able to apply for incentives through a relatively simple process. Since savings and incentives are deemed, the prescriptive offer is a transactional, cost effective, relatively straightforward and easily verifiable approach that generates savings for Enbridge's customers. The Prescriptive offer involves calculating annual savings based on substantiation documents that provide deemed cubic meter savings. Updates to these documents are typically filed with the Board for approval on an annual basis. The costs for energy efficient upgrades are offset by energy savings. Examples of prescriptive technologies are low-flow showerheads, air door heat containment systems, ozone laundry, ENERGY STAR products and demand control kitchen ventilation. Enbridge also offers quasi-prescriptive incentives for a range of measures where the incentive is determined by a simple calculation based on the equipment installed. Measures include demand control ventilation, infrared heaters, make-up air units, and high efficiency boilers. Quasi-prescriptive incentives are offered and subject to the same process as fixed incentives, retaining all of the advantages that the offer presents to the customer.

Witnesses: D. Bullock
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For 2016, Enbridge will increase fixed incentives as part of a strategy to target more participation among commercial and industrial customers, specifically smaller customers. It is anticipated that higher incentives, covering a larger proportion of the incremental cost of more energy efficient capital equipment, will work to overcome one of the main barriers to adoption in the commercial sector. Higher fixed incentives are necessary in order for the offer to be competitive and relevant to customers, especially in light of low natural gas prices, and greater incentive levels from electric LDC's.
Offer Timing:
This offer is a continuation of the 2015 offer with incentives as described above. It will continue throughout the 2016-2020 plan.
Estimated Participation:
See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets
Offer Theory:
Provide existing commercial and industrial customers easy to access prescriptive incentives for pre-approved measures.
There are a number of key barriers to the adoption of energy efficiency in the small commercial and industrial sectors. These include:

Lack of funding for capital and operational measures; preference to more attractive electrical incentives;
Uncertainty of savings or ROI below customer's threshold;
Lack of time and conflicting priorities;
Property owned by others (split incentive); and
Lack of technical expertise and offer awareness.

The commercial and industrial sector prescriptive offer is designed to address these barriers to participation by providing a suite of prescriptive type incentives including the following features:

Expand offers into new segments and develop channel strategies;
Outreach to participants and stakeholders which includes information regarding energy efficient alternatives, case studies, etc.; and
Faster and easier access to incentives.

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<tr><td>EVALUATION GOALS AND OBJECTIVES</td><td>
Key Offer Evaluation Metrics: Cubic Cumulative Meters (CCM)

Ensure appropriate tracking, reporting, and verification has been completed throughout the offer year;
Assess effectiveness of delivery methodology including uptake by customers.

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	Research Questions: • How effective is the delivery approach? • Are the incentives at the appropriate level for effective engagement of the market? • Are there LDC programs that can be leveraged?
EVALUATION APPROACH	**Impact Evaluation:** • Ensure accurate tracking of the offer participants and measures installed. • On-site verification of installation by third party of select measures. **Process Evaluation:** • Survey participants to determine effectiveness of incentive and offer. • Survey delivery partners and contractors to determine effectiveness of incentives, where applicable. **Evaluation Dependencies:** • Site verifications require access to customer facilities.
DATA COLLECTION RESPONSIBILITIES	Data submissions are provided to Enbridge by customer/contractor as part of incentive/rebate processing. Data may include: • Customer Information • Installation Address • Technology (make, model, serial # if required, and units installed) • Invoice for proof of purchase/installation • Contractor Information

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Offer Evaluation Plan (2016 to 2020) Home Energy Conservation Resource Acquisition

OFFER OVERVIEW	**Offer Description:** The Home Energy Conservation offer is a direct-to-consumer delivered initiative designed to encourage residential customers to install at least two eligible energy efficiency measures and achieve a minimum percentage of annual natural gas savings. **Goals and Objectives:** The goal of the Home Energy Conservation offer (HEC) is to promote meaningful improvements to residential customers' gas consumption and thereby help customers lower their energy bills. **Target Market:** • This offer targets Rate 1 residential customers. • **Eligibility Requirements:** To be eligible for the offer, customers must meet the following criteria: Be a residential homeowner in the EGD franchise area; • Achieve at least 15% gas savings; • Have a valid Enbridge Gas account in good standing; • Use an approved Certified Energy Evaluator ("CEE"); • Install at least two measures; and, • Complete a pre- and post-energy audit. **Key Offer Elements:** Enbridge's incentive funds will be directed at covering audit costs and providing a performance incentive based on natural gas saved as a result of measures installed. **Offer Timing:** The offer is expected to continue throughout the 2016-2020 Plan. **Estimated Participation:** See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets **Offer Theory:** Financial incentives and information garnered from home energy audits aim to encourage homeowners to engage in a holistic, multi-measure approach to improved energy efficiency. There are a number of key barriers to the adoption of energy efficiency for this sector, which include:

	• The cost of many energy retrofit measures requires significant investment on the part of the homeowner. There is also a cost associated with identifying potential measures related to energy efficiency; • Given the complexity of the various retrofit activities, it can be difficult for customers to prioritize which to undertake. It is often important to focus on key energy related measures and, where possible, to time energy retrofit work with other renovation and upgrade projects; • Locating reliable renovation contractors and contractors with knowledge and experience in energy retrofits is an additional challenge; and • The return on investment for natural gas savings relative to electricity, in addition to the competitiveness of incentives may impact customer decision making.
EVALUATION GOALS AND OBJECTIVES	**Key Offer Evaluation Metrics:** Cubic Cumulative Meters (CCM) & Participants • Ensure participant savings claims reflect modelled savings • Ensure that appropriate tracking and verification has been completed. **Research Questions** • Is the portfolio of average savings reaching the minimum level? • What is the experience of HEC participants? • Are there LDC programs that can be leveraged?
EVALUATION APPROACH	**Impact Evaluation:** • Assess the validity of natural gas savings claims among a sample of participants. **Process Evaluation:** • Survey participants to determine effectiveness of offer. • Engage energy auditors to evaluate effectiveness of delivery process. **Evaluation Dependencies:** • NRCan for Quality Assurance; Energy Auditors for participant data.
DATA COLLECTION RESPONSIBILITIES	Regular data submissions provided to Enbridge by Energy Auditors. Data may include: • File ID number • Enbridge Account number • Address of audit / retrofit • Square footage of home • Base Case and Upgrade Case natural gas consumption

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	• Measures completed at home • Total gas savings (m^3 and %)

Offer Evaluation Plan (2016 to 2020) Residential Adaptive Thermostats Resource Acquisition

OFFER OVERVIEW	**Offer Description:** A rebate will be offered to customers upon proof of purchase and photo of the installed adaptive thermostat. **Goals and Objectives:** The goal of this offer is to broadly reach the mass market with a straight forward prescriptive offer that can help customers achieve gas savings. **Target Market:** • The Adaptive Thermostat offer is targeted to Rate 1 residential customers. **Eligibility Requirements:** To be eligible, customers will have to meet the following eligibility criteria: • Be a residential customer in Enbridge franchise area; • Have a valid Enbridge account number; • Proof of purchase and installation of the unit. **Key Offer Elements:** Customers will purchase an adaptive thermostat for installation. To receive a $75 rebate, the customer will submit the necessary documents to Enbridge. **Offer Timing:** The offer will commence in 2016 and is expected to continue through to 2020. **Estimated Participation:** See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets **Offer Theory:** Not all customers can afford, or in some cases even need, a complete 'whole-home' energy retrofit. Many of these customers however could still benefit from the potential savings that can be generated from installing and using an adaptive thermostat. This offer will address a stand-alone prescriptive opportunity for residential customers. Beyond comfort, adaptive thermostats enable energy savings by either adapting to customer behaviour or through geo-coded data identifying when occupants

	are at home. Adaptive or geo-fencing thermostats typically have the following key features and benefits: • Ease of creating schedules; • Intuitive set up, typically using narrative and lifestyle related questions; • Pro-active or forced automatic energy savings adjustment features; • Greater control with remote web or app based control ; • Maintenance alerts; • Ongoing "Learning" of lifestyle schedules and preferences The rationale underpinning the offer suggests that the rebate will motivate customers to purchase an adaptive thermostat instead of a lower efficiency programmable thermostat. Barriers that interrupt customer uptake of adaptive thermostats typically include: • Cost of the unit – The typical cost of an adaptive thermostat is approximately $250, whereas programmable thermostats range in cost from $50 - $100; • Unfamiliar technology – Wi-Fi technology adoption in general has been growing in certain areas, and for certain demographics, and slower in others. A multitude of features can be perceived as complicated; • Customers continue to remain cautious around Wi-Fi connected purchases with concerns around personal data ownership and security;
Evaluation Goals and Objectives	**Key Offer Evaluation Metrics:** Cubic Cumulative Meters (CCM) • Verify savings claims R**esearch Questions** • Are there LDC programs that can be leveraged?
Evaluation Approach	**Impact Evaluation:** • Conduct verification of a sample of participants to confirm eligibility criteria was met and qualified back up was received. **Process Evaluation:** • Survey participants to determine effectiveness of offer **Evaluation Dependencies:** • Access may be required to a sample number of participant homes; Data to be shared between customer and Enbridge.

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

DATA COLLECTION RESPONSIBILITIES	The following is the type of information that will be requested and sent via email by the customer to Enbridge for tracking and reporting purposes: • customer name; • customer address; • customer Enbridge account number; • model number/name of replaced unit; • dated photo of the installed unit; and/or • proof of purchase

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

Offer Evaluation Plan (2016 to 2020) Low Income Multi-Residential – Affordable Housing

OFFER OVERVIEW	**Offer Description:** Utility costs are often among the largest operating cost items for multi-residential buildings. Low income buildings are generally older and in need of building repair or upgrade. The Low Income Multi-Residential Affordable Housing offer is available to social and assisted housing providers and owners of income qualified private buildings to reduce their energy consumption. Energy efficiency improvements have the potential to contribute to housing affordability, preservation of the building stock, and the creation of healthier and more comfortable living environments for low income households. **Goals and Objectives:** This offer aims to reduce the energy consumption of existing Low Income Multi-Residential buildings in the affordable housing market. **Target Market:** • The target market for this offer is social and assisted housing providers who own and operate Part 3 buildings and private multi-residential building owners that provide housing to low income households. In addition, shelters and supportive housing will be targeted for this offer. **Eligibility Requirements:** • Part 3 buildings owned and operated by social housing providers as well as privately owned buildings identified as low income; • Privately-owned low income buildings (municipally informed and census defined). Additional eligibility requirements for private sector participants will be determined by Enbridge in consensus with the Low Income working group of intervenors and stakeholders; • Social housing and assisted housing buildings as described in the Housing Reform Act of 2011 and 2015-2020 DSM Framework. **Key Offer Elements:** This offer adopts the “building as a system” approach. Building assessments, comprehensive building audits, enhanced financial incentives, technical services; benchmarking, outreach and education will be used to stimulate housing providers, building operators, and residents. Gas use is typically paid for by the building owners – resident co-operation and changes in behaviour will be needed to help realize sustainable and persistent savings and benefits. Sector association collaboration and partnerships including Housing Services Corporation (HSC), Ontario Non-Profit Housing Association (ONPHA) and Federation of Rental Housing Providers of Ontario (FRPO) are critical in raising offer awareness and extending outreach efforts to the target market.

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

Offer Timing:
This offer is a continuation of the 2015 offer. It is expected to continue throughout the 2016-2020 Plan.

Estimated Participation:
See Exhibit B, Tab 1, Schedule 4

Offer Theory:
This offer provides enhanced financial incentives and free services that support the installation of energy-saving measures in multi-residential buildings as defined above, in order to reduce participants' energy usage and lower—or limit increases in—their energy bills. The offer is also expected to generate non-energy benefits arising from improved resident comfort and health.

Barriers:
Barriers unique to low income customers and social housing providers discourage customers from making investments in energy conservation and participating in DSM offers.

The biggest challenge in this market is the split incentive, whereby the building owner makes a significant financial investment in equipment or building upgrades, with limited or no ability to recoup their costs. Tenants, who are the ultimate consumers, do not have the same motivation to reduce their consumption. Other barriers that can impact the level of participation among building owners often include:

- Tenant/Landlord relationship
- Access to capital; financing conditions
- Uncertainty in market valuation of energy efficiency
- Security and privacy concerns
- Complexities and uncertainties in retrofit planning and implementation
- Lack of confidence in retrofit performance and savings
- Tolerance for adoption of new technologies
- Health and safety issues
- Lack of data on the building stock, or even for individual buildings
- Social and multicultural diversity among residents
- Building code violations or poor enforcement of building code
- Pass through of beneficial improvements to tenants, e.g. rent adjustments
- Municipal regulations, e.g. claw back of operating savings from energy efficiency by Service Manager on social housing units

Following are the incentives for this offer:

- Fixed incentives are calculated based on a fixed dollar amount for smaller types of HVAC equipment. Eligible measures that would result in gas savings include:

	o Condensing boilers o High efficiency boilers o Energy recovery ventilation systems o Heat recovery ventilation systems; • In Suite Direct Install determined as follows: o Free showerheads from Enbridge supplied and installed o Free supply and installation of heat reflector panels • Custom Incentives calculated based on projected first year natural gas savings at a rate of 40 cents/m^3 saved up to 50% of the cost of the retrofit. Eligible measures that would result in gas savings include, but not limited to: o Building envelope o Controls o DHW replacement o Drain water heat recovery o High Efficiency Boilers o Make Up Air Unit o Operational improvements (20 cents/m^3); • Half the cost of an energy audit up to $5,000 per building or $0.01 per m^3 of gas consumed in the past calendar year (whichever is less); • Free ASHRAE Level 1 Building Assessment • Boiler Tune-Up • Resident engagement programs • Free access to a benchmarking program such as the City of Toronto's STEP Program.
EVALUATION GOALS AND OBJECTIVES	**Key Offer Evaluation Metrics:** Cubic Cumulative Meters (CCM) **Prescriptive**: • Ensure appropriate tracking, reporting, and verification • Assess effectiveness of delivery methodology including uptake by customers. **Research Questions**: • How effective is the delivery approach? • Are the incentives at the appropriate level for effective engagement of the market? • Are there LDC programs that can be leveraged? **Custom**: • Verify savings per the CPSV review process and conduct internal review of offer processes • Ensure savings reflect appropriate engineering reviews and related studies • Establish appropriate tracking and reporting criteria. • Inform long-term DSM offer planning

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

	Research Questions: • Are the incentives at the appropriate level for effective engagement of the market? • Are there LDC programs that can be leveraged?
EVALUATION APPROACH	**Impact Evaluation (Prescriptive):** • Ensure accurate tracking of the offer participants and measures installed. On-site verification of installation of select measures. **Impact Evaluation (Custom):** • Ensure accurate tracking of the offer participants. • Ensure project files are complete, accurate, and substantiated. • An engineering firm will be contracted to conduct the Custom Projects Savings Verification (CPSV) – the Low Income multi-residential projects are included as part of the Commercial CPSV review. **Evaluation Dependencies:** • Site verifications require access to customer facilities.
DATA COLLECTION RESPONSIBILITIES	Data submissions provided to Enbridge by delivery partners. Data may include: • Customer Information • Address of audit/installation • Ownership – tracking of private or social assisted buildings • Technology (make, model, and units installed) • number of participants (buildings) in Resident engagement program and estimated reach (tenants) • quantity of educational materials distributed to building tenant • Invoice for proof of purchase/installation • Contractor Information Enbridge: • Complete Custom project files with the required supporting documentation (including customer information, measures installed, estimated savings calculations, and participant incentive).

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

Offer Evaluation Plan (2016 to 2020) Home Winterproofing

OFFER OVERVIEW	**Offer Description:** The Home Winterproofing offer, previously known as Home Weatherization, aims to reduce energy costs for low-income households by increasing the energy efficiency of their homes, while addressing comfort and some health and safety aspects in the homes. There is no cost to participate in the offer, and the energy efficiency measures and services are free to the customer. **Goals and Objectives:** The Home Winterproofing offer aims to reduce energy costs for Part 9 low-income households by increasing the energy efficiency of their homes, while addressing comfort and some health and safety aspects in the homes. **Target Market:** • Social housing and assisted housing, and income qualified customers residing in low-rise buildings (OBC Part 9). **Eligibility Requirements:** • Participants must meet defined customer and income eligibility requirements – such that participants are: o An Enbridge customer o Pay their own gas bill o Use Natural Gas for heating • Further, customers must meet the defined Income Eligibility Requirement. The Income Eligibility Requirement is based on StatsCan Low Income Cut-Off (LICO) plus 35% based on community size greater than 500,000. The LICO values are updated by StatsCan annually, and adjusted for offer purposes accordingly, or: • Participants must be part of one of the following government assistance programs* o Ontario Works o Guaranteed Income Support o National Child Benefit Supplement o Allowance for Seniors o Allowance for Survivors o Ontario Disability Support Programs o Electric Utility HAP Program o Healthy Smiles Ontario Dental Program * The government assistance programs listed above are income tested programs and may change from time to time.

Witnesses: D. Bullock
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R. Sigurdson

- Customers that qualify for the OEB's Low Income Energy Assistance Program (LEAP) automatically meet the income eligibility requirements of the offer.

Key Offer Elements:
The offer provides a free home assessment and weatherization services (e.g. insulation and air sealing) to qualified Enbridge customers who meet the offer's income and customer eligibility criteria. As a direct install offer, there is no financial cost to the offer participant for the energy assessment and weatherization products and services. As part of the safety measures, a carbon monoxide monitor is provided where one is not present in the home.

At time of home assessment, the home is also prequalified for water conservation measures (e.g. showerheads, aerators and pipe insulation) as well as a programmable thermostat, heat reflectors and a drain-water heat recovery unit. Going forward, Enbridge will include a modest Furnace Replacement component beginning in 2016.

The offer will continue to be delivered by community based organizations that have relationships with low income interest groups and/or are well entrenched and trusted in the communities that they serve.

Offer Timing:
The offer is expected to continue throughout the 2016-2020 Plan.

Estimated Participation:
See Exhibit B, Tab 1, Schedule 4 Program Budget, Metrics and Targets

Offer Theory:
This offer reaches out to low-income households that are often on fixed incomes or rely on income assistance programs, or the working poor, who are the most vulnerable to volatile changes in energy markets. Enbridge works with community based organizations to deliver and implement the offer. The offer is supported by the OEB's Low Income Energy Assistance Program (LEAP) that provides low income energy consumers with emergency financial assistance, special customer rules, and access to utility DSM and CDM offers.

Barriers:
While homes of private low income customers are generally larger than social housing units, low income households are difficult to find, primarily because they are unlikely to self-identify as low income, and when found, they are hard to reach because of other barriers such as communication and language challenges. Other barriers to participation in energy efficiency offers include:

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Affordability and access to funds to make equipment upgrades and repair
Awareness or limited understanding of energy and energy use
Competing priorities for basic necessities – food, shelter, health and safety
Lack of trust – “nothing is free”, or threatened claw backs of government financial assistance.

In addition, for many Part 9 type homes, the offer has encountered several physical and structural problems with the units such as the presence of asbestos and excessive hoarding that elevates the safety risk for both the offer contractors, residents and housing providers. In this case, the units are rejected for participation in the offer until these environmental and safety risks are addressed adequately.
</td></tr>
<tr><td>EVALUATION GOALS AND OBJECTIVES</td><td>
Key Offer Evaluation Metrics: Cubic Cumulative Meters (CCM)

Ensure savings estimates accurately reflect on-site conditions
Assess effectiveness of delivery methodology including uptake by low income customers.

Research Questions:

Are the modelled savings estimates appropriate for this target market?
How effective is the delivery approach?
Are the incentives at the appropriate level for effective engagement of the market?
Are there LDC programs that can be leveraged?

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<tr><td>EVALUATION APPROACH</td><td>
Impact Evaluation:

Ensure accurate tracking of offer participants and installed measures.
Verification of installation of select measures.

Process Evaluation:

Survey participants to determine effectiveness of incentives and offers.
Survey delivery partners and contractors to determine effectiveness of incentives, where applicable.

Evaluation Dependencies

Third party installation contractors, access to homes, information from housing providers

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<tr><td>DATA COLLECTION RESPONSIBILITIES</td><td>
Data submissions provided to Enbridge by delivery partners. Data may include:

Address and date of audit/retrofit
Ownership – tracking of private or social assisted
Base Case natural gas consumption
Number and type of measures installed
Number of energy audits conducted

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</table>

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

	• Copies of work plans and pre and post installation photos • Quantity of educational materials distributed to homes

Offer Evaluation Plan (2016 to 2020) Low Income New Construction

OFFER OVERVIEW	**Offer Description:** The Low Income New Construction Housing offer is designed to encourage municipalities to take a proactive role in incorporating energy efficiency standards in their own affordable housing plans and programs. The offer will provide financial incentives and enabling support to their affordable housing partners to facilitate the integration of energy efficiency in these housing projects. **Goals and Objectives:** The overarching goal of this New Construction offer is to promote the adoption of energy efficiency features and practices among developers and builders of affordable housing. **Target Market:** The offer is specifically directed to Residential and Multi-Residential building affordable developments, and will be focused on working with and through municipal governments, private and non-profit sector local housing corporations. **Eligibility Requirements:** • Developers and builders of new “affordable housing” as qualified by a municipal, provincial and/or federal housing program. • Developers and builders of both singe family Part 9 houses and multi-residential Part 3 buildings are eligible to participate **Key Offer Elements:** The offer will provide incentives and extend technical support to assist affordable housing builders to exceed Ontario Building Code requirements by at least 15%. The offer will engage the affordable housing community to encourage adoption of energy efficiency measures and technologies as a means to maintain housing affordability. Entry to the offer will be simplified to encourage broader participation among large and small affordable housing participants. Specifically, the Enbridge offer contemplates the following: • Enbridge funded workshops, modelling tools, and charrettes that promote the integrated design process, and energy efficient and green construction practices; • Access to an energy efficiency/sustainability consultant during the various phases of project design; • Energy education materials targeted to future residents as part of their “welcome to your new home” package.

Witnesses: D. Bullock
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R. Sigurdson

- For Part 3 (Multi-Residential) developments:
  - Tiered financial incentives depending on the modelled savings achievement. For example, 15%, 20%, 25% above code costs will be $3,000, $10,000; and $25,000 respectively, plus an additional up to $2,250 per unit, to a maximum of $100,000 per building.
  - At building completion, provide a commissioning incentive of up to $10,000.
- For Part 9 (Residential) developments that build an 'Energy Star home', a prescriptive incentive of up to $3,000 will be provided per home.

The financial incentives above are indicative values only and subject to change as informed by the 2015 pilot. It is important to note that in 2017 there will be a change implemented to the Ontario Building Code. The expected amendment is anticipated to include an increase to the required energy efficiency of newly constructed buildings of 15% greater than the OBC of 2012. As such all offers that seek to address the overall efficiency of a building will need to be addressed once the updated OBC goes into effect.

Offer Timing:
The offer is a new pilot offer in 2015. It is expected that a full roll-out in 2016 will occur as informed by lessons learned and continue through to 2020.

Estimated Participation:
See Exhibit B, Tab 1, Schedule 4 Program Budget, Metrics and Targets

Offer Theory:
The offer has been informed by the Company's Savings by Design offer; however, due to the wide range in the type of builders, buildings and project size, certain offer elements have been modified to meet the needs of the target market. Some elements, such as the use of the Integrated Design Process (IDP) with charrettes and incentives per unit built to energy efficiency standards, will be part of the offer.

Barriers:
Barriers to participation in this type of offer include:

- The government grant funding for new construction under the federal-provincial Investment in Affordable Housing Program (IAH) poses financial challenges for builders to explore and/or incorporate energy efficiency and sustainability features that exceed building code requirements;
- The expected building code change in 2017 makes it even more difficult to recognize savings above code.
- While IAH Program Guidelines for Service Managers encourages enhanced energy efficiency features in project applications, there are neither pathways nor tools available in the IAH program to foster this outcome;
- Private developers are likely to build residential units that will generate higher margins, and therefore, may be less willing to explore more costly

	energy efficient upgrades; Applying for public funding subsidies can be cumbersome and onerous, which can disenchant builders from participating in government-sponsored initiatives.
Evaluation Goals and Objectives	**Key Offer Evaluation Metrics:** Cubic Cumulative Meters (CCM) • Ensure appropriate tracking and verification has been completed throughout offer year. • Assess offer performance against metrics by way of review of supporting documentation • Inform current and long-term planning and implementation
Evaluation Approach	• Confirm participant eligibility: affordable housing project • Verify completion • Verify IDP documents to establish estimated savings are at least 15% above OBC
Data Collection Responsibilities	• Participant summary of the number of builders/developers with completed IDP's. • Periodic report outlining current and projected participation as well as documentation supporting participant eligibility, as outlined above.

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

Offer Evaluation Plan (2016 to 2020)
Savings by Design – Residential Market Transformation and Energy Management

<table>
<tr>
<td>OFFER OVERVIEW</td>
<td>
Offer Description:
This offer aims to change the residential new construction marketplace by educating and incenting builders to construct in a more energy efficient manner.

Goals and Objectives:
Engage builders to participate in an Integrated Design Process (IDP) that demonstrates an alternative approach to exploring energy efficient construction, and includes an incentive for these participants to build homes to the specification outlined in the IDP. The target for this offer is to have homes achieve at least 25% better performance than the energy requirements prescribed by the 2012 Ontario Building Code (OBC) while simultaneously preparing builders for the upcoming Code update in 2017.

Target Market: The target market is builders of new, Part 9 residential low rise houses (towns, semis and detached homes) in the Enbridge franchise territory. The ultimate beneficiaries of better designed homes will be Rate 1 Residential customers.

Eligibility Requirements:

Intent to construct at least 50 homes through the duration of the commitment to participate in the offer.
Proposed homes will be constructed in Enbridge franchise area.
Building construction must be completed within three years of signing the agreement.
Project must be in the design phase or earlier in the process.

Key Offer Elements:

A whole-system approach is the most effective means to transforming the market and helping homeowner’s to future proof their homes and their long term energy operating costs. The Savings by Design (SBD) approach is a total energy approach, as opposed to a ‘gas only’ approach.
The intent is to engage builders who construct multiple homes within Enbridge’s franchise area. Enbridge will be targeting much of its promotional activity directly to the builder market. The primary means to educate and change the marketplace, however, will remain the IDP.

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Witnesses: D. Bullock
R. Idenouye
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F. Oliver-Glasford
R. Sigurdson

<table>
<tr><td></td><td>Offer Elements:
IDP
Recruit builders, enroll them in IDP workshops
Support for sector associations who train energy raters, IDP professionals, etc.
Provide incentive for homes achieving greater than 25% above 2012 OBC efficiency and 15% above 2017 OBC efficiency
Monitor OBC development and ensure that OBC officials are aware of the market activities that might support a higher OBC
Offer Timing:
This offer is expected to continue throughout the 2016-2020 Plan.

Estimated Participation:
See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets

Offer Theory:
This offer utilizes a market transformational approach that is grounded in providing a solid education to the builders by giving them access to experts during the design phase of a project, and then following up with incentivized performance. Recognizing the barriers in the marketplace, Enbridge developed the offer “Savings by Design” to help residential builders achieve higher levels of energy and environmental performance through the application of the Integrated Design Process (IDP).

Barriers:
Barriers to participation for this offer include:
Municipalities are reacting to an infrastructure deficit by increasing development charges as well as mandating storm water management plans and energy performance and sustainable design requirements for new subdivision plans.
Builders today build many different forms of housing and need to experience the integrated design process for more than one type of application</td></tr>
<tr><td>EVALUATION GOALS AND OBJECTIVES</td><td>Key Offer Evaluation Metrics: Projects through IDP, Completed units
Confirm homes built; confirm enrollment documentation is complete
Research Questions
Are homes being constructed per SBD standard?
Have participants completed the required enrollment form?
Are there LDC programs that can be leveraged?</td></tr>
<tr><td>EVALUATION APPROACH</td><td>Impact Evaluation:
Confirmed modeled savings via delivery agent verification process;</td></tr>
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Witnesses: D. Bullock
R. Idenouye
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	Confirm completion of enrollment form; assess whether there is a continuing need for the offer and, if so, whether it should be expanded, reduced or maintained at the same scale. • Delivery agent to use modelling software to confirm building designs perform to the SBD standard. **Process Evaluation:** • Survey participants to determine effectiveness of incentives and offer delivery **Evaluation Dependencies:** • Delivery Agent; Participants to share architectural and design specifications with delivery agent for modeling purposes.
DATA COLLECTION RESPONSIBILITIES	• Delivery agent to provide regular quality assurance and verification reports for a sample group of participants; • Tracking log of participant enrollments.

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

Offer Evaluation Plan (2016 to 2020)
Savings by Design – Commercial Market Transformation and Energy Management

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<tr>
<td>OFFER OVERVIEW</td>
<td>
Offer Description:
This offer aims to transform the new construction market by removing barriers to educating builders on ways to improve the energy efficiency of their projects

Goals and Objectives:
This offer aims to increase the number of newly constructed buildings that are built 25% more efficient than the Ontario Building Code while simultaneously preparing builders for the upcoming Code update in 2017.

Target Market:

The target market for this offer includes Commercial, Institutional, and Multi-Residential or Industrial Buildings covered under the Ontario Building Code (OBC) Part 3.

Eligibility Requirements:

Commercial, Institutional, Multi-Residential or Industrial Buildings covered under the Ontario Building Code (OBC) Part 3;
A minimum threshold of 50,000 square feet (including aggregate multi-location projects);
Building(s) must be within the Enbridge Gas Distribution service area, or for aggregate projects 75% of the project square footage must be in the service area;
Building(s) must be in the design phase or earlier in the process;
Building construction must be completed within five years of signing the agreement
Building commissioning must be completed at most 1 year after construction is completed.
Builders are eligible to participate in the offer multiple times for different projects.

Key Offer Elements:

This offer is a direct to builder/developer delivered offer driven by an internal sales team. Enbridge support is primarily financial in nature, covering the cost of the Integrated Design Process (IDP), and providing an incentive at both pre and post construction phases based on specific deliverables.
The offer will be made available to a greater portion of the commercial market (smaller buildings)
Incentives will be leveraged to provide more support post-IDP / pre- and post-construction

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Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

	Offer Timing: This offer is expected to continue to the end of 2020. **Estimated Participation:** See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets **Offer Theory:** The intent of this offer is to achieve higher energy performance (25% better than the 2012 Ontario building code) through a combination of: • Improved sizing and design • Optimization of passive solar, day lighting, and natural ventilation • Integration of high efficiency lighting and HVAC systems • Integration of lighting and HVAC controls to respond directly to occupant loads • Reduction and/or optimization of internal loads • Improving the thermal characteristics of the building envelope • Managing the environmental impacts Barriers: The construction process remains time consuming and uncertain, being driven by demand, but made challenging by municipal requirements, some of which may be environmental, or related to energy efficiency. Additionally, code changes every 5 years keep builders searching for ways to be more efficient and cost-effective. The next code change is scheduled for 2017 and is expected to have an energy efficiency increase of 15% over the previous (2012) code. Other barriers that builders face that impact their ability to incorporate the highest standards of energy efficiency include: • A lack of trades people and lack of training on quality installation • Availability of land has decreased and the cost of that land has increased affecting affordability • The recovery of the recession has been slow
EVALUATION GOALS AND OBJECTIVES	**Key Offer Evaluation Metrics:** New developments enrolled • Confirm all documentation is filed **Are participants submitting all required documents prior to receiving incentives?** **Research Questions** • What are participants' motivations to partake in Savings by Design? • Are there LDC programs that can be leveraged?
EVALUATION APPROACH	**Impact Evaluation**: • Review documentation submitted by participants for incentives

Witnesses: D. Bullock
R. Idenouye
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R. Sigurdson

	Process Evaluation: • Conduct survey of participants' experience and feedback on the offer **Evaluation Dependencies:** • Delivery agent; Third party survey firm; participant respondents
DATA COLLECTION RESPONSIBILITIES	• Participant tracking report. • Survey consultant to collect survey responses from participants and provide analysis.

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

Offer Evaluation Plan (2016 to 2020)
New Construction Commissioning Market Transformation and Energy Management

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<tr>
<td>OFFER OVERVIEW</td>
<td>
Offer Description:
This offer facilitates efficient, optimal building functionality at the commissioning stage.

Goals and Objectives:
The New Construction Commissioning offer intends to incent builders to use the Commissioning phase to ensure that a facility is set up to operate at the most efficient level possible, that it meets the needs of the building owner and occupants, and provides training to facility operators. The aim is to have the building operate as it was designed to ensure that systems are installed, functionally tested, and capable of being operating at the highest performance level.

Target Market:
Builders and designers of new, Part 3 commercial buildings, mainly Rate 6 customers.

Eligibility Requirements:
Commercial builders and designers within the Enbridge franchise territory.

Key Offer Elements:

Recruiting new construction projects; enrolling them in the commissioning offer.
Supporting commissioning agents, contractors, professionals, etc.
Providing incentives that lead to the development and utilization of project specific building Commissioning plans
Monitoring the Ontario Building Code (OBC) development and ensuring that OBC officials are aware of the market activities that might support commissioning in the code

The commissioning offer approach will be broken into separate initiatives based on different phases of the build cycle.

Offer Timing:
This offer will commence in 2016 and is expected to continue throughout the 2016-2020 Plan.

Estimated Participation:
See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets

Offer Theory:
Commissioning is an underutilized strategy for saving energy and money as well as
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Witnesses: D. Bullock
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M. Lister
F. Oliver-Glasford
R. Sigurdson

	reducing greenhouse gas emissions while managing related risks. It is important to strike a healthy balance between standardization and recognize that each building is unique. When a building is initially commissioned it undergoes an intensive quality assurance process that begins during design and continues through construction, occupancy, and operations. Commissioning ensures that the new building operates initially as was intended and that building staff are trained and ready to operate and maintain systems and equipment properly. However to obtain a high quality energy efficient building, four phases have to be completed: 1. Design Brief 2. Design Phase 3. Construction Phase 4. Commissioning Phase Each participant will receive $12,500 to put towards the cost to develop a final plan Barriers: Barriers to participation in this offer include the following: • Affordability is seen as the biggest barrier - indicating that sustainable construction is more expensive to execute compared to standard practices. • There remain barriers to more widespread acceptance of sustainable construction. Such barriers include perception about increased project costs and lack of experience and / or techniques and technologies - the increased project costs can manifest itself both in the design and the construction phases of a project.
EVALUATION GOALS AND OBJECTIVES	**Key Offer Evaluation Metrics:** Enrollments • Ensure eligibility of enrollment • Inform current and long-term offer planning and implementation. **Research Questions**: • Are there additional barriers to this type of offer? • What enhancements could improve take up? • Is there an approach that would allow us to capture m^3 or CCM savings? • Are there LDC programs that can be leveraged?
EVALUATION APPROACH	**Impact Evaluation:** • Document review of participant applications to enroll in the offer **Process Evaluation**: • Survey Participants to gain feedback on the offer. **Evaluation Dependencies:** • Delivery agents; third party survey firm; participant respondents

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

DATA COLLECTION RESPONSIBILITIES	• Participant tracking • Supporting documentation

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

Offer Evaluation Plan (2016 to 2020)
My Home Health Record (MHHR) Market Transformation and Energy Management

OFFER OVERVIEW	**Offer Description:** This offer provides customers with information on their energy use and personalized energy saving advice. The MHHR offer motivates customers to use measurably less energy and, as a result, save money on their monthly energy bills. **Goals and Objectives:** The primary goals for this offer is to help customers reduce consumption and drive participants into alternate DSM offers that would provide further benefits and increase energy literacy. **Target Market:** • This offer is targeted at residential customers in Rate 1. **Eligibility Requirements:** • Residential Rate 1 customers in the Enbridge franchise area. **Key Offer Elements:** • Targeted households automatically receive one welcome insert to introduce them to the offer followed by four home energy reports annually. These reports provide periodic updates on the energy usage behaviour of a given household, and offer tips for saving energy. • All offer participants will have access to a web portal that currently resides on the myEnbridge website. This site will enable participants to create a profile, perform an online audit, access energy savings tips, monitor usage over time, and compare usage to neighbours for benchmarking purposes. • All participants will have a clear method for opting out of the offer if they no longer want to receive the information. **Offer Timing:** The offer is expected to continue throughout the 2016-2020 Plan. **Estimated Participation:** See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets **Offer Theory:** The main motivation behind behavioural offers is to ensure that homes or buildings are operated at their peak design capability to ensure the maximum potential for energy efficiency is realized. In addition, the same information used

	to educate a broader audience of consumers can be used to drive behavioural changes and identify where retrofit dollars can most productively be employed. The following are barriers to behaviour modifications: • Behavioral offers are typically disadvantaged in cost-effectiveness calculations. By presuming constant year-over-year savings and predefined measure lives, traditional efficiency accounting is heavily geared to installed measures; • Many residential customers are not adequately motivated to modify behaviour; • In the past, it has proven easier to change a person's thoughts around a specific topic (perception) vs. motivating them to take action (behaviour); • Privacy laws and practices present a challenge; and • Ontario's natural gas distributors are not enabled with time-of-use, interval or smart metering infrastructure.
EVALUATION GOALS AND OBJECTIVES	**Key Offer Evaluation Metrics:** Cubic Cumulative Meters (CCM) • Verify savings claims; cross check for double counting • Assess offer effectiveness **Research Questions** • What is the experience of participants?
EVALUATION APPROACH	**Impact Evaluation:** • Assess verification and methodology for removing participants using related Enbridge offers **Process Evaluation:** • Conduct survey of participants' experience and feedback on the offer **Evaluation Dependencies:** • Delivery agent (Opower); Third party survey firm; Participant identification and gas savings data to be shared between delivery agent and Enbridge
DATA COLLECTION RESPONSIBILITIES	• Delivery agent (Opower) to provide annual gas savings report and methodology; • Survey consultant to collect survey responses from sample group of participants and provide analysis.

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

Offer Evaluation Plan (2016 to 2020)
Home Rating Market Transformation and Energy Management

<table>
<tr>
<td>OFFER OVERVIEW</td>
<td>
Offer Description:
This offer aims to make the use of a home rating system in the resale home market standard practice.
Goals and Objectives:
Achieve voluntary adoption of a home rating system that becomes standard practice in the resale home market – similar to the home inspection experience.
Target Market:
This offer is targeted to Rate 1, residential customers, Energy Evaluators and Real Estate Agents.
Eligibility Requirements:
To be eligible for the offer, customers must meet the following criteria:

Be a residential homeowner in the EGD franchise area;
Have a valid Enbridge Gas account in good standing;
Use an approved Certified Energy Evaluator (“CEE”);
Install at least two measures; and,
Complete a pre- and post-energy audit.

Key Offer Elements:
The offer employs concurrent communication campaigns with mass outreach (realtors, home inspectors and consumers) and targeted municipalities and financial institutions. The aim is to increase home rating assessments undertaken by energy raters. Further, promotion of home rating will also target homebuyers and sellers.
Offer Timing:
This offer will commence in 2016 and is expected to continue through to 2020.
Estimated Participation:
See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets
Offer Theory:
The focus of this offer will initially be on establishing the necessary conditions for eventual market adoption. The communication campaigns will aim to influence the attitudes and perceptions of homeowners, the real estate community and home inspectors.
</td>
</tr>
</table>

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

	Enbridge will also focus on home buyers and sellers as the energy audit experience provides the knowledge and understanding which in turn will create value in the market to drive behaviour changes and choices. Barriers: Barriers to participation in this offer include: • lack of understanding of an energy rating; • perceived high cost of obtaining an energy rating and subsequent retrofit activities; • lack of understanding of the impact of energy retrofits on utility bills; and • perception of extended home selling period as a result of pursuing an energy audit.
EVALUATION GOALS AND OBJECTIVES	**Key Offer Evaluation Metrics:** Ratings completed • Provide confidence in the reported results and tracking methodology **Research Questions** • To what degree has the offer changed homeowners' perceptions of a home energy rating system?
EVALUATION APPROACH	**Impact Evaluation:** • Quantitative and qualitative methods will be employed in assessing the effects of the offer on participants' perceptions of an energy rating system. • The survey will provide statistical and demographic information to determine the baseline **Process Evaluation**: • Survey participants to determine effectiveness of incentives and offer delivery. **Evaluation Dependencies:** • Survey respondents; Survey firm; Certified Energy Advisers; Access to participants' home to conduct energy rating; Certified energy raters to share addresses
DATA COLLECTION RESPONSIBILITIES	**Certified Energy Advisers to provide:** • Addresses of homes where energy audit was performed

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

Offer Evaluation Plan (2016 to 2020)
School Energy Competition
Market Transformation and Energy Management

OFFER OVERVIEW	**Offer Description:** Schools offer a unique opportunity for DSM. Students are the future leaders of our society, and building energy management awareness, education, and behavioral modifications into their behaviours from a young age will help to permeate deeper values of conservation in our society. **Goal and Objectives:** Educate and empower students to take action on energy use within their schools, homes and communities. **Target Market:** • This offer is targeted to Elementary and Secondary Schools, which are in the Rate 6 Customer class. **Eligibility Requirements:** • Participating schools must be part of a board within one of the publicly funded systems (English/French/Public/Catholic) in Ontario within the Enbridge franchise area. **Key Offer Elements:** The Competition will have 5 main offer elements which include: 1. Education 2. Behavioural Change 3. Implementation 4. Monitoring 5. Performance **Offer Timing:** The offer will commence in 2016 and is expected to continue throughout the 2016-2020 Plan **Estimated Participation:** See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets **Offer Theory:** Enbridge intends to target all grades with education materials and workshops to build awareness and to begin to influence behavioral modification. For grades 9 -12, Enbridge will sponsor an annual competition to produce results arising from a combination of operational improvements, behavioural changes, and educational competitions.

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

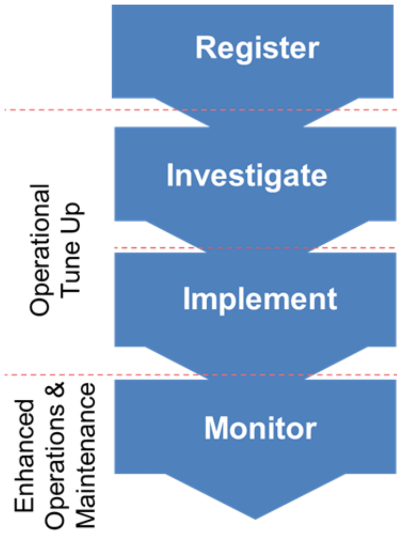
	To facilitate the offer, Enbridge will employ an Energy Management Information System (EMIS) to provide a web-based dashboard that will illustrate a school's gas consumption, their baseline usage prior to enrolling in the competition, and the school's consumption relative to conservation goals. This will allow students to gain a deeper understanding of how their school consumes energy and how their actions can reduce energy consumption. Barriers: • Public schools, in particular, face economic challenges and budget constraints
EVALUATION GOALS AND OBJECTIVES	**Key Offer Evaluation Metrics:** Participants • A participant is a school that registers, implements, and has access to an EMIS system to log competition activities.
EVALUATION APPROACH	• Ensure accurate tracking and reporting of the offer participants.
DATA COLLECTION RESPONSIBILITIES	Administration tracking information includes: • School information • Measures implemented and participation • Performance results

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

Offer Evaluation Plan (2016 to 2020)
Run it Right
Market Transformation and Energy Management

OFFER OVERVIEW	**Offer Description:**
	The Run it Right (RiR) offer is focused on engaging building owners to commit to long term space and water heating energy savings through continuous operational improvements. The offer includes data driven analysis of current energy use trends, a re-commissioning (RCx) building tune-up approach focused on optimization of current equipment, continuous monitoring through an Energy Management Information System (EMIS) and reporting of consumption.
	
	The RiR offer was introduced in 2012 and has continued to evolve since its inception.
	
	Goal and Objectives:
	The goal of the RiR offer is to engage medium to large commercial customers and small industrial customers in the pursuit of enhanced energy performance. The methods by which RiR seeks to aid this pursuit is through monitoring, measuring, benchmarking, and identification of both retrofit and operational opportunities.
	
	Target Market:
	• This offer applies to commercial customers in the Rate 6, 110, 115, 135, 145, or 170 classes. The target market for this offer is commercial customers including property managers of large commercial, multifamily, institutional buildings.
	
	Eligibility Requirements:
	• The RiR offer will seek to engage Medium – Large Commercial Customers and small Industrial customers. While larger volume buildings will yield greater gas savings resulting from operational improvements, all customers can benefit from the RiR offer.
	• Participation in the Run It Right offer will require:
	  o Buildings with an interval meter or where Enbridge can access daily gas consumption
	  o Have a building that has been occupied for more than 12 months
	
	Key Offer Elements:
	The RiR offer consists of the following process elements:

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson



- Customers register for the RiR program

- Customers receive *a b*uilding Investigation by our Investigation Agents
- Receive an Investigation Report including:
  - Energy consumption analysis & load profile
  - List of operational opportunities & recommendations

- Implementation incentive between $2,000 to $10,000 depending on building consumption and complexity.
- Receive a customizable checklist and calculation tool to select measures with your Service Provider/Contractor.

- *Free* access to the Enbridge Energy Management Information System (EMIS) for the 12 month monitoring term.**
- Training and Support

Incentives for this offer are as follows:

Annual Normalized Gas Consumption (m^3)	Complex	Moderately Complex	Simple
> 1,000,000	$10,000	$7,500	$5,500
500,000 - 999,999	$7,000	$5,500	$4,500
300,000 - 499,999	$6,000	$4,500	$3,500
0 - 299,999	$5,000	$3,500	$2,500

Offer Timing:
The offer is a continuation of the 2015 offer with incentives as described above. It is expected to continue throughout the 2016-2020 Plan.

Estimated Participation:
See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets

Offer Theory:
This offer allows customers to utilize actual data in order to support continuous operational improvements resulting in educated energy efficiency decisions

RiR still needs to overcome many barriers in terms of the knowledge gap that exists for customers and industry service providers to transform the marketplace towards performance based conservation. Some of these barriers include:

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

<table>
<tr><td></td><td>Customers are not aware of all opportunities, or if they are, are not convinced about the magnitude of the potential savings;
Challenges in quantifying savings while accounting for external factors
Energy management is not a core business activity and customers do not have in-house expertise to undertake the required activities;
Monitoring service providers typically do not offer a complete package of analysis;
Monitoring services may only be cost effective for a limited type and size of customer;
Monitoring services do not always provide recommendations for appropriate energy solutions to address excessive consumption;
Re-commissioning agents tend to have either limited analytical services or limited interest in continuous monitoring and sustained energy savings;
Energy profiling is often undertaken by vendors whose financial interest is in selling capital improvements rather than operational improvements;
Utilities have traditionally not been viewed as energy partners by commercial sector customers for the operations of their buildings
The commercial sector Run it Right Offer aims to address these barriers by empowering building owners/managers through the provision of:
Education and awareness of potential energy savings opportunities that can be achieved through on-going maintenance improvements
Detailed natural gas use data identifying specific energy savings opportunities</td></tr>
<tr><td>EVALUATION GOALS AND OBJECTIVES</td><td>Key Offer Evaluation Metrics: Participants and Cubic Cumulative Meters (CCM)
Verify gas savings
Establish appropriate tracking and reporting criteria.
Inform current and long-term program planning and implementation.
Verify participants commission a data-acquisition infrastructure to allow them to measure and track energy use, and related energy drivers.
Ensure appropriate measurement, monitoring, calibrating and reporting of the energy use is implemented.
Assess effectiveness of delivery methodology including uptake and implementation by customers.</td></tr>
<tr><td>EVALUATION APPROACH</td><td>Resource Acquisition:
Ensure accurate tracking of the offer participants.
Ensure project files are complete, accurate, and substantiated.
Conduct third party verification</td></tr>
</table>

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

	Market Transformation and Energy Management: • Ensure participants meet eligibility criteria as applicable • Ensure accurate tracking of the offer participants. **Process Evaluation** • Conduct internal review of offer processes and effectiveness **Evaluation Dependencies** • Participation in survey by RIR customers • Site verification would require access to customer facilities
DATA COLLECTION RESPONSIBILITIES	Information gathered may include: • Customer information • Site Address • Measure(s) Installed • Baseline consumption • Projected percentage savings Ongoing consumption data tracking – currently occurs through a 3rd party Energy Management Information System (EMIS) for all participants. A utility manager/dashboard for internal use, enables tracking of participant progress during the monitoring period.

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

Offer Evaluation Plan (2016-2020)
Comprehensive Energy Management
Market Transformation and Energy Management

OFFER OVERVIEW	**Offer Description:** The CEM offer helps customers reduce operational costs by presenting energy as a controllable input cost, and seeks to create a culture of sustainable energy efficiency. **Offer Goals and Objectives:** This offer intends to build and expand on Enbridge's existing industrial offers to guide and help customers set up their own structured approach to identifying, quantifying and implementing energy efficient measures. **Target Market:** • The Comprehensive Energy Management (CEM) offer is targeted to large commercial and industrial consumers in the rate classes 6, 110, 115, 135, 145, and 170. **Eligibility Requirements:** • Industrial and large commercial customers within the Enbridge franchise area who are prepared to commit to the key offer elements as outlined below **Key Offer Elements:** The Comprehensive Energy Management (CEM) offer intends to provide a structured process to energy management, where customers are taken through a holistic and systematic approach, with the end goal of creating a culture shift by looking at processes as a means to an end. The offer aims to act as a driving force to identify and implement a diversified set of practices such as operational, managerial, organizational, cultural, behavioural, and educational, process system optimization and continuous improvement, to institutionalize long-term energy savings in addition to identifying equipment retrofit opportunities. By participating in the offer, customers will be required to undertake the following commitments: • Make energy usage a specific performance goal; • Provide resources to follow through with energy management; • Create energy or sustainability teams (at least one dedicated energy manager or champion who allocates some time towards energy efficiency activities); • Demonstrate commitment to improve operations and maintenance practices; • Be willing to invest in enabling EMIS elements (Sub-meters, Hardware / Software) to better control and manage their energy;

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

- Be willing to participate in training;

In addition to the technical expertise, flexibility and unbiased energy management support provided by Enbridge, the CEM offer provides customers with 4 types of financial funding:

1. Funds to offset the cost of monitoring systems
2. Incentives for cubic meters saved and verified through behavioral activities
3. Incentives for specific energy efficiency project investments
4. Funds to promote energy awareness and encourage energy efficiency training

Offer Timing:
This offer is expected to continue throughout the 2016-2020 Plan.

Estimated Participation:
See Exhibit B, Tab 1, Schedule 4 Program Budgets, Metrics and Targets

Offer Theory:
The industrial manufacturing sector is complex, with specific characteristics which require a tailored approach to meet customer needs. The most predominant characteristics of the Industrial Manufacturing sector are:

- Manufacturing is Complex and Sophisticated – Understanding energy use patterns in manufacturing plants can be more complex than for other sectors.
- Manufacturing is Diverse – The industrial sector is comprised of a wide variety of different industry subsectors with different production processes and energy use characteristics. Even within subsectors, processes, product mix output, and energy use patterns vary substantially.
- Decision Making – Energy efficiency is often not integrated into a customer's decision making process for several reasons:
  - Energy efficiency projects may compete with core business investments that dominate attention, as well as investments for safety, environmental or other requirements;
  - Decision-making is often split across business units;
  - The skills required to identify and pursue energy efficiency opportunities are not always present
- Operational Cycles Influence Investment Decisions – Energy efficiency investments are heavily dependent on the industrial customer's operational cycle, which can span four to seven years on average.

Other jurisdictions throughout North America have recognized the value of similar programs to drive deeper energy efficiency through culture changes. In our jurisdictional scan Enbridge has identified 14 existing strategic energy management (SEM) offers in North America.

	Barriers: • Knowledge barriers – customers often do not have the technical experience or knowledge to apply a structured approach in order to identify the opportunity areas suitable to their circumstances; • Financial barriers – Not understanding or knowing what the costs or financial returns will be in undertaking a review of their energy consumption opportunities; • Cultural barriers – Energy efficiency competes with other capital investments which may be viewed by a customer's management as more important.
EVALUATION GOALS AND OBJECTIVES	**Key Offer Evaluation Metrics:** Participants and Cubic Cumulative Meters (CCM) • Verify gas savings • Establish appropriate tracking and reporting criteria. • Inform current and long-term program planning and implementation. • Verify participants commission a data-acquisition infrastructure to allow them to measure and track energy use, and related energy drivers. • Ensure appropriate measurement, monitoring, calibrating and reporting of the energy use is implemented. • Assess effectiveness of delivery methodology including uptake and implementation by customers.
EVALUATION APPROACH	**Resource Acquisition:** • Ensure accurate tracking of the offer participants. • Ensure project files are complete, accurate, and substantiated. • Conduct third party verification **Market Transformation and Energy Management:** • Ensure participants meet eligibility criteria as applicable • Ensure accurate tracking of the offer participants. **Process Evaluation** • Conduct internal review of offer **Evaluation Dependencies:** • Site verification would require access to customer facilities
DATA COLLECTION RESPONSIBILITIES	• Utilize the Company's current results tracking mechanisms. • Project files with the required supporting documentation.

Witnesses: D. Bullock
R. Idenouye
M. Lister
F. Oliver-Glasford
R. Sigurdson

TOTAL RESOURCE COST PLUS AND PROGRAM ADMINISTRATOR COST ANALYSIS

1. In accordance with the Ontario Energy Board's (the "Board") *EB-2014-0134 Filing* Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020) ("DSM Filing Guidelines"), the Board indicates that Enbridge Gas Distribution Inc. ("Enbridge" or the "Company") should screen its Demand Side Management ("DSM") Programs using the Total Resource Cost Plus ("TRC-Plus") Test as a primary screening mechanism. In the DSM Filing Guidelines to the 2015 to 2020 DSM Framework EB-2014-0134 the Board "has determined that the natural gas utilities should screen prospective DSM programs using the Total Resource Cost-Plus ("TRC-Plus") test. The TRC-Plus test measures the benefits and costs of DSM programs for as long as those benefits and costs persist and applies a 15% non-energy benefit adder."[1]

2. The Board has also instructed the gas utilities to use the Program Administrator Cost ("PAC") Test as a secondary test to help prioritize programs within its DSM Portfolio.[2] "The PAC test measures the gas utilities' avoided costs and the costs of DSM programs experienced by the gas utility system".[3] Both the TRC and the PAC Test are also used by Local Distribution Companies ("LDCs") when screening Conservation and Demand Management ("CDM") programs, providing for a degree of comparability and consistency between the cost-effectiveness of DSM and CDM.

3. As per Section 15.1 of the DSM Framework Enbridge shall treat 2015 as a Transition Year in which DSM programs, budgets, targets and shareholder incentives are rolled forward from 2014 into 2015. On this basis, the cost-effectiveness analysis relevant to the 2015 Transition Year can be found at

[1] EB-2014-0134, "Filing Guidelines to the 2015-2020 DSM Framework", December 22, 2014, Section 9.0 Cost-Effectiveness Screening, page 32
[2] EB-2014-0134, "*Repor of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020)*", December 22, 2014, Section 9.0 Cost-Effectiveness Screening, page 32
[3] IBID

EB-2012-0394, Exhibit B, Tab 2, Schedule 3, page 3, subject to updates as appropriate.

4. Tables 1 through 5 present the TRC-Plus analysis and ratio, as well as the PAC analysis and ratio for Enbridge's programs and offers from 2016 to 2020.

Table 1: 2016 TRC-Plus and PAC Analysis and Ratios

	2016 Total Resource Acquisition & Low Income						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Multi-Year TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Resource Acquisition & Low Income	**27,593**	**$197,679,402**	**$61,788,935**	**$28,302,232**	**$9,955,306**	**$9,532,442**	**$81,276,683**	**$116,402,720**	**2.43**	**$47,789,979**	**$149,889,423**	**4.14**
Resource Acquisition	25,175	$181,910,918	$53,420,885	$21,049,291	$8,173,154	$7,095,334	$68,689,373	$113,221,545	2.65	$36,317,779	$145,593,139	5.01
Low Income	2,418	$15,768,484	$8,368,050	$7,252,941	$1,782,152	$2,437,108	$12,587,310	$3,181,174	1.25	$11,472,200	$4,296,284	1.37

	2016 Resource Acquisition						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Resource Acquisition TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Large Customers												
Large Custom	727	$107,723,103	$33,514,579	$4,961,668	$1,213,962	$0	$34,728,541	$72,994,562	3.10	$6,175,630	$101,547,473	17.44
Large Prescriptive	4,165	$12,651,668	$624,575	$686,971	$541,225	$0	$1,165,800	$11,485,868	10.85	$1,228,195	$11,423,473	10.30
Small Customers												
Small Custom	112	$6,548,034	$5,145,084	$442,932	$402,102	$0	$5,547,187	$1,000,847	1.18	$845,034	$5,702,999	7.75
Small Prescriptive	1,959	$14,135,866	$293,721	$767,561	$201,196	$0	$494,916	$13,640,950	28.56	$968,757	$13,167,109	14.59
Small DI	1,679	$12,116,457	$251,760	$3,647,650	$1,307,771	$0	$1,559,531	$10,556,925	7.77	$4,955,421	$7,161,036	2.45
Residential Thermostats	9,014	$4,883,593	$2,704,231	$676,058	$200,313	$0	$2,904,544	$1,979,049	1.68	$876,371	$4,007,222	5.57
Residential CER	7,508	$23,614,454	$10,886,935	$9,145,025	$3,003,292	$0	$13,890,227	$9,724,227	1.70	$12,148,317	$11,466,137	1.94
RA Overall TRC	**25,175**	**$181,910,918**	**$53,420,885**	**$21,049,291**	**$8,173,154**	**$7,095,334**	**$68,689,373**	**$113,221,545**	**2.65**	**$36,317,779**	**$145,593,139**	**5.01**

	2016 Low Income						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Low Income TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Multi-Family Homes - Part 3	217	$9,955,200	$4,457,993	$2,426,481	$852,547	$0	$5,310,541	$4,644,659	1.87	$3,279,028	$6,676,172	3.04
Single Family Homes - Part 9	2,201	$5,813,284	$3,910,056	$4,826,460	$929,604	$0	$4,839,661	$973,623	1.20	$5,756,064	$57,220	1.01
LI Overall TRC	**2,418**	**$15,768,484**	**$8,368,050**	**$7,252,941**	**$1,782,152**	**$2,437,108**	**$12,587,310**	**$3,181,174**	**1.25**	**$11,472,200**	**$4,296,284**	**1.37**

Witnesses: R. Idenouye
S. Moffat
F. Oliver Glasford
B. Ott
R. Sigurdson

Table 2: 2017 TRC-Plus and PAC Analysis and Ratios

	2017 Total Resource Acquisition & Low Income						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Multi-Year TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Resource Acquisition & Low Income	**39,221**	**$214,079,341**	**$68,412,131**	**$33,132,221**	**$10,254,095**	**$9,966,611**	**$88,632,836**	**$125,446,504**	**2.42**	**$53,352,927**	**$160,726,414**	**4.01**
Resource Acquisition	36,683	$197,519,876	$59,621,660	$25,370,572	$8,357,623	$7,602,524	$75,581,808	$121,938,068	2.61	$41,330,719	$156,189,157	4.78
Low Income	2,538	$16,559,465	$8,790,471	$7,761,650	$1,896,471	$2,364,087	$13,051,029	$3,508,436	1.27	$12,022,208	$4,537,257	1.38

	2017 Resource Acquisition						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Resource Acquisition TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Large Customers												
Large Custom	723	$107,131,840	$33,330,627	$5,056,873	$1,237,255	$0	$34,567,882	$72,563,958	3.10	$6,294,128	$100,837,712	17.02
Large Prescriptive	4,142	$12,582,226	$621,147	$700,152	$551,610	$0	$1,172,757	$11,409,470	10.73	$1,251,762	$11,330,464	10.05
Small Customers												
Small Custom	113	$6,639,307	$5,216,802	$452,358	$410,659	$0	$5,627,461	$1,011,846	1.18	$863,017	$5,776,290	7.69
Small Prescriptive	1,986	$14,332,906	$297,815	$783,895	$205,477	$0	$503,292	$13,829,614	28.48	$989,372	$13,343,534	14.49
Small DI	1,702	$12,285,348	$255,270	$3,725,272	$1,335,600	$0	$1,590,870	$10,694,478	7.72	$5,060,872	$7,224,476	2.43
Residential Thermostats	18,000	$9,751,905	$5,400,000	$1,350,000	$175,000	$0	$5,575,000	$4,176,905	1.75	$1,525,000	$8,226,905	6.39
Residential CER	10,000	$31,451,423	$14,500,000	$12,180,000	$3,000,000	$0	$17,500,000	$13,951,423	1.80	$15,180,000	$16,271,423	2.07
RA Overall TRC	**36,683**	**$197,519,876**	**$59,621,660**	**$25,370,572**	**$8,357,623**	**$7,602,524**	**$75,581,808**	**$121,938,068**	**2.61**	**$41,330,719**	**$156,189,157**	**4.78**

	2017 Low Income						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Low Income TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Multi-Family Homes - Part 3	228	$10,458,881	$4,686,633	$2,529,410	$888,711	$0	$5,575,345	$4,883,536	1.88	$3,418,121	$7,040,760	3.06
Single Family Homes - Part 9	2,310	$6,100,583	$4,103,837	$5,232,240	$1,007,760	$0	$5,111,597	$988,986	1.19	$6,240,000	-$139,417	0.98
LI Overall TRC	**2,538**	**$16,559,465**	**$8,790,471**	**$7,761,650**	**$1,896,471**	**$2,364,087**	**$13,051,029**	**$3,508,436**	**1.27**	**$12,022,208**	**$4,537,257**	**1.38**

Witnesses: R. Idenouye
S. Moffat
F. Oliver Glasford
B. Ott
R. Sigurdson

Table 3: 2018 TRC-Plus and PAC Analysis and Ratios

	2018 Total Resource Acquisition & Low Income						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Multi-Year TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Resource Acquisition & Low Income	**50,480**	**$228,930,159**	**$75,514,353**	**$37,660,849**	**$10,007,457**	**$10,334,976**	**$95,856,786**	**$133,073,372**	**2.39**	**$58,003,282**	**$170,926,876**	**3.95**
Resource Acquisition	47,913	$211,063,335	$66,127,776	$29,449,803	$7,978,007	$7,985,813	$82,091,596	$128,971,738	2.57	$45,413,623	$165,649,712	4.65
Low Income	2,567	$17,866,824	$9,386,577	$8,211,046	$2,029,450	$2,349,163	$13,765,190	$4,101,634	1.30	$12,589,659	$5,277,165	1.42

	2018 Resource Acquisition						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Resource Acquisition TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Large Customers												
Large Custom	739	$109,497,756	$34,066,705	$5,262,555	$1,287,579	$0	$35,354,284	$74,143,471	3.10	$6,550,134	$102,947,622	16.72
Large Prescriptive	4,234	$12,860,094	$634,864	$728,630	$574,046	$0	$1,208,910	$11,651,184	10.64	$1,302,676	$11,557,418	9.87
Small Customers												
Small Custom	106	$6,242,419	$4,904,950	$425,317	$386,111	$0	$5,291,060	$951,359	1.18	$811,427	$5,430,992	7.69
Small Prescriptive	1,867	$13,476,108	$280,012	$737,035	$193,194	$0	$473,206	$13,002,902	28.48	$930,229	$12,545,879	14.49
Small DI	1,600	$11,550,949	$240,010	$3,502,583	$1,255,761	$0	$1,495,771	$10,055,178	7.72	$4,758,344	$6,792,606	2.43
Residential Thermostats	27,000	$14,627,858	$8,100,000	$2,025,000	$150,000	$0	$8,250,000	$6,377,858	1.77	$2,175,000	$12,452,858	6.73
Residential CER	12,346	$38,828,917	$17,901,235	$15,461,213	$2,538,787	$0	$20,440,022	$18,388,895	1.90	$18,000,000	$20,828,917	2.16
RA Overall TRC	**47,913**	**$211,063,335**	**$66,127,776**	**$29,449,803**	**$7,978,007**	**$7,985,813**	**$82,091,596**	**$128,971,738**	**2.57**	**$45,413,623**	**$165,649,712**	**4.65**

	2018 Low Income						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Low Income TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Multi-Family Homes - Part 3	257	$11,766,241	$5,282,740	$2,821,839	$991,457	$0	$6,274,197	$5,492,044	1.88	$3,813,296	$7,952,945	3.09
Single Family Homes - Part 9	2,310	$6,100,583	$4,103,837	$5,389,207	$1,037,993	$0	$5,141,830	$958,753	1.19	$6,427,200	-$326,617	0.95
LI Overall TRC	**2,567**	**$17,866,824**	**$9,386,577**	**$8,211,046**	**$2,029,450**	**$2,349,163**	**$13,765,190**	**$4,101,634**	**1.30**	**$12,589,659**	**$5,277,165**	**1.42**

Witnesses: R. Idenouye
S. Moffat
F. Oliver Glasford
B. Ott
R. Sigurdson

Table 4: 2019 TRC-Plus and PAC Analysis and Ratios

	2019 Total Resource Acquisition & Low Income						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Multi-Year TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Resource Acquisition & Low Income	**53,654**	**$244,216,107**	**$80,430,185**	**$40,310,421**	**$9,925,335**	**$10,541,676**	**$100,897,196**	**$143,318,911**	**2.42**	**$60,777,432**	**$183,438,675**	**4.02**
Resource Acquisition	51,103	$226,104,202	$70,952,218	$31,935,153	$7,855,297	$8,145,529	$86,953,044	$139,151,158	2.60	$47,935,979	$178,168,223	4.72
Low Income	2,551	$18,111,905	$9,477,967	$8,375,267	$2,070,039	$2,396,147	$13,944,152	$4,167,753	1.30	$12,841,453	$5,270,453	1.41

	2019 Resource Acquisition						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Resource Acquisition TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Large Customers												
Large Custom	784	$116,042,833	$36,102,996	$5,674,151	$1,388,283	$0	$37,491,279	$78,551,554	3.10	$7,062,435	$108,980,398	16.43
Large Prescriptive	4,487	$13,628,788	$672,813	$785,618	$618,943	$0	$1,291,756	$12,337,033	10.55	$1,404,561	$12,224,227	9.70
Small Customers												
Small Custom	115	$6,730,651	$5,288,575	$458,581	$416,309	$0	$5,704,884	$1,025,767	1.18	$874,891	$5,855,760	7.69
Small Prescriptive	2,013	$14,530,099	$301,912	$794,680	$208,304	$0	$510,216	$14,019,883	28.48	$1,002,984	$13,527,115	14.49
Small DI	1,726	$12,454,371	$258,782	$3,776,527	$1,353,977	$0	$1,612,759	$10,841,612	7.72	$5,130,504	$7,323,867	2.43
Residential Thermostats	28,271	$15,316,532	$8,481,345	$2,120,336	$98,164	$0	$8,579,509	$6,737,023	1.79	$2,218,500	$13,098,032	6.90
Residential CER	13,687	$43,046,794	$19,845,796	$17,013,270	$2,394,549	$0	$22,240,345	$20,806,449	1.94	$19,407,819	$23,638,974	2.22
RA Overall TRC	**51,103**	**$226,104,202**	**$70,952,218**	**$31,935,153**	**$7,855,297**	**$8,145,529**	**$86,953,044**	**$139,151,158**	**2.60**	**$47,935,979**	**$178,168,223**	**4.72**

	2019 Low Income						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Low Income TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Multi-Family Homes - Part 3	263	$12,070,551	$5,413,973	$2,878,276	$1,011,286	$0	$6,425,259	$5,645,292	1.88	$3,889,562	$8,180,989	3.10
Single Family Homes - Part 9	2,288	$6,041,355	$4,063,994	$5,496,991	$1,058,753	$0	$5,122,747	$918,608	1.18	$6,555,744	-$514,389	0.92
LI Overall TRC	**2,551**	**$18,111,905**	**$9,477,967**	**$8,375,267**	**$2,070,039**	**$2,396,147**	**$13,944,152**	**$4,167,753**	**1.30**	**$12,841,453**	**$5,270,453**	**1.41**

Witnesses: R. Idenouye
S. Moffat
F. Oliver Glasford
B. Ott
R. Sigurdson

Table 5: 2020 TRC-Plus and PAC Analysis and Ratios

	2020 Total Resource Acquisition & Low Income						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Multi-Year TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Resource Acquisition & Low Income	**55,121**	**$248,761,523**	**$81,836,574**	**$41,151,041**	**$10,092,613**	**$10,752,509**	**$102,681,696**	**$146,079,828**	**2.42**	**$61,996,163**	**$186,765,361**	**4.01**
Resource Acquisition	52,586	$230,397,348	$72,271,707	$32,608,268	$7,981,173	$8,308,440	$88,561,320	$141,836,028	2.60	$48,897,881	$181,499,466	4.71
Low Income	2,535	$18,364,176	$9,564,867	$8,542,773	$2,111,440	$2,444,070	$14,120,376	$4,243,800	1.30	$13,098,282	$5,265,894	1.40

	2020 Resource Acquisition						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Resource Acquisition TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Large Customers												
Large Custom	787	$116,492,346	$36,242,847	$5,787,634	$1,416,049	$0	$37,658,896	$78,833,450	3.09	$7,203,683	$109,288,663	16.17
Large Prescriptive	4,504	$13,681,582	$675,419	$801,330	$631,322	$0	$1,306,741	$12,374,841	10.47	$1,432,652	$12,248,930	9.55
Small Customers												
Small Custom	117	$6,865,266	$5,394,348	$467,753	$424,635	$0	$5,818,984	$1,046,282	1.18	$892,389	$5,972,878	7.69
Small Prescriptive	2,054	$14,820,706	$307,950	$810,574	$212,470	$0	$520,421	$14,300,286	28.48	$1,023,044	$13,797,662	14.49
Small DI	1,760	$12,703,463	$263,958	$3,852,058	$1,381,056	$0	$1,645,014	$11,058,449	7.72	$5,233,114	$7,470,348	2.43
Residential Thermostats	29,094	$15,762,352	$8,728,213	$2,182,053	$80,817	$0	$8,809,030	$6,953,323	1.79	$2,262,870	$13,499,482	6.97
Residential CER	14,248	$44,810,623	$20,658,971	$17,353,536	$2,442,440	$0	$23,101,411	$21,709,212	1.94	$19,795,976	$25,014,647	2.26
RA Overall TRC	**52,586**	**$230,397,348**	**$72,271,707**	**$32,608,268**	**$7,981,173**	**$8,308,440**	**$88,561,320**	**$141,836,028**	**2.60**	**$48,897,881**	**$181,499,466**	**4.71**

	2020 Low Income						TRC + 15% Societal Benefits			PACT + 15% Societal Benefits		
Low Income TRC Scenarios	Participants or Units Installed	Total NPV Benefits	Total Incremental Costs	Total Incentive Costs	Total Fixed Costs	Total Administrative Costs	TRC Total Costs	TRC Net Benefit	TRC Ratio	PACT Total Cost	PACT Net Benefit	PACT Ratio
Multi-Family Homes - Part 3	270	$12,381,475	$5,540,329	$2,935,841	$1,031,512	$0	$6,571,841	$5,809,634	1.88	$3,967,353	$8,414,122	3.12
Single Family Homes - Part 9	2,265	$5,982,701	$4,024,538	$5,606,931	$1,079,928	$0	$5,104,466	$878,235	1.17	$6,686,859	-$704,158	0.89
LI Overall TRC	**2,535**	**$18,364,176**	**$9,564,867**	**$8,542,773**	**$2,111,440**	**$2,444,070**	**$14,120,376**	**$4,243,800**	**1.30**	**$13,098,282**	**$5,265,894**	**1.40**

Witnesses: R. Idenouye
S. Moffat
F. Oliver Glasford
B. Ott
R. Sigurdson

5. Enbridge has used the information generated through its TRC-Plus and PAC analysis as an important input in its overall portfolio design. The Company's Multi-Year DSM Plan seeks to balance cost-effectiveness alongside the Board's guiding principles and key priorities, many of which drive important activities which are less cost-effective than Enbridge's past results. The Company believes that this balance has been appropriately struck.

Witnesses: R. Idenouye
S. Moffat
F. Oliver Glasford
B. Ott
R. Sigurdson

SYSTEM CHARACTERISTICS AND RATE ALLOCATION

1. As directed by the Ontario Energy Board (the "Board") in Section 14.1 of the Boards EB-2014-0134 *Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020)*, this schedule provides information on Enbridge Gas Distribution Inc.'s ("Enbridge" or the "Company") system characteristics, the forecast allocation of demand side management ("DSM') costs amongst rates, and forecast associated bill impacts.

2. For the purpose of demonstrating the forecast rate allocations and bill impacts of Enbridge's Demand Side Management Incentive Deferral Account ("DSMIDA"), the Company has represented shareholder incentives assuming an achievement level of 100% of target. In the Enbridge's view, achieving 100% of the targets proposed from 2015 to 2020 will be a challenging undertaking. As such, Enbridge believes that the impacts presented below are more indicative of the future rate impacts of DSM than similar figures based on the Company achieving a weighted score of 150% on all of its DSM scorecards.

3. In order to be responsive to the Board's specific direction regarding bill impacts to residential customers and further direction to demonstrate impacts based on the potential maximum shareholder incentive amounts, the Company has included a footnote to each table which identifies Rate 1 average monthly bill impacts reflecting the inclusion of maximum shareholder incentive amounts.

4. Tables 1 through 10 below outline the above noted elements chronologically:

Table 1: 2015 Rate Allocation of DSM Budget

2015 DSM Budget - Forecasted Rate Allocation ($ millions)				
Rate Class	DSM Budget less Low Income	Low Income Budget	Total DSM Budget	Shareholder Incentive @ 100% Target ($ million)
Rate 1	$13.20	$4.67	**$17.86**	$2.10
Rate 6	$14.76	$1.93	**$16.69**	$1.96
Rate 9	$0.00	$0.00	**$0.00**	$0.00
Rate 110	$0.95	$0.07	**$1.02**	$0.12
Rate 115	$0.97	$0.04	**$1.01**	$0.12
Rate 125	$0.02	$0.05	**$0.07**	$0.01
Rate 135	$0.25	$0.00	**$0.25**	$0.03
Rate 145	$0.35	$0.04	**$0.40**	$0.05
Rate 170	$0.36	$0.03	**$0.39**	$0.05
Rate 200	$0.00	$0.02	**$0.02**	$0.00
Rate 300	$0.00	$0.00	**$0.00**	$0.00
TOTAL	**$30.86**	**$6.86**	**$37.72**	**$4.44**

Witnesses: R. Idenouye
S. Moffat
F. Oliver-Glasford
B. Ott
R. Sigurdson

Table 2: 2015 System Characteristics and Bill Impacts

2015 System Characteristics and Bill Impact - Forecasted Rate Allocation								
Rate Class	**Number of Customers**	**Gas Consumption/ Throughput (10^6m^3)**	**Annual Volume for Typical Customer (m3)**	**Average Annual Effective Rate ($/m3)**	**Annual Bill for Typical Customer**	**Average Annual Bill Impact of DSM per Customer**	**Average Monthly Bill Impact of DSM per Customer***	**Average Annual Bill Impact per Customer %**
Rate 1	1,933,935	4,676	2,400	$0.0043	$1,018	$10.25	$0.85	1.0%
Rate 6	164,629	4,695	22,606	$0.0040	$6,382	$89.81	$7.48	1.4%
Rate 9	7	1	-	-	-	-	-	-
Rate 110	186	495	598,568	$0.0023	$128,349	$1,377.61	$114.80	1.1%
Rate 115	31	532	4,471,609	$0.0021	$873,021	$9,520.91	$793.41	1.1%
Rate 125	5	0	-	-	-	-	-	-
Rate 135	42	58	598,567	$0.0049	$112,451	$2,915.22	$242.93	2.6%
Rate 145	80	139	598,568	$0.0032	$122,931	$1,907.84	$158.99	1.6%
Rate 170	34	493	9,976,120	$0.0009	$1,764,592	$8,925.68	$743.81	0.5%
Rate 200	1	169	-	-	-	-	-	-
Rate 300	2	30	-	-	-	-	-	-

*The average monthly bill impact of DSM for Rate 1 customers inclusive of the maximum potential shareholder incentive is forecasted to be $0.99.

Witnesses: R. Idenouye
S. Moffat
F. Oliver-Glasford
B. Ott
R. Sigurdson

Table 3: 2016 Rate Allocation of DSM Budget

2016 DSM Budget - Forecasted Rate Allocation ($ millions)				
Rate Class	**DSM Budget less Low Income**	**Low Income Budget**	**Total DSM Budget**	**Shareholder Incentive @ 100% Target ($ million)**
Rate 1	$28.60	$6.90	**$35.50**	$2.34
Rate 6	$21.62	$2.86	**$24.48**	$1.61
Rate 9	$0.00	$0.00	**$0.00**	$0.00
Rate 110	$1.03	$0.10	**$1.14**	$0.07
Rate 115	$1.04	$0.06	**$1.10**	$0.07
Rate 125	$0.03	$0.08	**$0.10**	$0.01
Rate 135	$0.26	$0.01	**$0.27**	$0.02
Rate 145	$0.39	$0.06	**$0.45**	$0.03
Rate 170	$0.39	$0.05	**$0.45**	$0.03
Rate 200	$0.01	$0.03	**$0.03**	$0.00
Rate 300	$0.00	$0.01	**$0.01**	$0.00
TOTAL	**$53.38**	**$10.15**	**$63.54**	**$4.18**

Table 4: 2016 System Characteristics and Bill Impacts

2016 System Characteristics and Bill Impact - Forecasted Rate Allocation								
Rate Class	**Number of Customers**	**Gas Consumption/ Throughput (10^6m^3)**	**Annual Volume for Typical Customer (m3)**	**Average Annual Effective Rate ($/m3)**	**Annual Bill for Typical Customer**	**Average Annual Bill Impact of DSM per Customer**	**Average Monthly Bill Impact of DSM per Customer***	**Average Annual Bill Impact per Customer %**
Rate 1	1,968,960	4,709	2,400	$0.0080	$1,018	$19.29	$1.61	1.9%
Rate 6	162,517	4,660	22,606	$0.0056	$6,382	$126.57	$10.55	2.0%
Rate 9	8	1	-	-	-	-	-	-
Rate 110	191	620	598,568	$0.0020	$128,349	$1,168.93	$97.41	0.9%
Rate 115	27	472	4,471,609	$0.0025	$873,021	$11,132.02	$927.67	1.3%
Rate 125	5	0	-	-	-	-	-	-
Rate 135	41	56	598,567	$0.0051	$112,451	$3,051.13	$254.26	2.7%
Rate 145	101	163	598,568	$0.0030	$122,931	$1,784.52	$148.71	1.5%
Rate 170	34	453	9,976,120	$0.0010	$1,764,592	$10,462.16	$871.85	0.6%
Rate 200	1	186	-	-	-	-	-	-
Rate 300	2	30	-	-	-	-	-	-

*The average monthly bill impact of DSM for Rate 1 customers inclusive of the maximum potential shareholder incentive is forecasted to be $1.76.

Witnesses: R. Idenouye
S. Moffat
F. Oliver-Glasford
B. Ott
R. Sigurdson

Table 5: 2017 Rate Allocation of DSM Budget

2017 DSM Budget - Forecasted Rate Allocation ($ millions)				
Rate Class	**DSM Budget less Low Income**	**Low Income Budget**	**Total DSM Budget**	**Shareholder Incentive @ 100% Target ($ million)**
Rate 1	$36.19	$7.38	**$43.57**	$2.47
Rate 6	$23.38	$3.06	**$26.44**	$1.50
Rate 9	$0.00	$0.00	**$0.00**	$0.00
Rate 110	$1.11	$0.11	**$1.22**	$0.07
Rate 115	$1.13	$0.06	**$1.19**	$0.07
Rate 125	$0.03	$0.08	**$0.11**	$0.01
Rate 135	$0.28	$0.01	**$0.29**	$0.02
Rate 145	$0.42	$0.07	**$0.49**	$0.03
Rate 170	$0.42	$0.05	**$0.48**	$0.03
Rate 200	$0.01	$0.03	**$0.03**	$0.00
Rate 300	$0.00	$0.01	**$0.01**	$0.00
TOTAL	**$62.97**	**$10.86**	**$73.83**	**$4.18**

Witnesses: R. Idenouye
S. Moffat
F. Oliver-Glasford
B. Ott
R. Sigurdson

Table 6: 2017 System Characteristics and Bill Impacts

2017 System Characteristics and Bill Impact - Forecasted Rate Allocation								
Rate Class	**Number of Customers**	**Gas Consumption/ Throughput (10^6m^3)**	**Annual Volume for Typical Customer (m3)**	**Average Annual Effective Rate ($/m3)**	**Annual Bill for Typical Customer**	**Average Annual Bill Impact of DSM per Customer**	**Average Monthly Bill Impact of DSM per Customer***	**Average Annual Bill Impact per Customer %**
Rate 1	2,004,109	4,709	2,400	$0.0098	$1,018	$23.47	$1.96	2.3%
Rate 6	163,953	4,660	22,606	$0.0060	$6,382	$135.51	$11.29	2.1%
Rate 9	8	1	-	-	-	-	-	-
Rate 110	191	620	598,568	$0.0021	$128,349	$1,246.71	$103.89	1.0%
Rate 115	27	472	4,471,609	$0.0027	$873,021	$11,895.41	$991.28	1.4%
Rate 125	5	0	-	-	-	-	-	-
Rate 135	41	56	598,567	$0.0055	$112,451	$3,264.43	$272.04	2.9%
Rate 145	101	163	598,568	$0.0032	$122,931	$1,898.54	$158.21	1.5%
Rate 170	34	453	9,976,120	$0.0011	$1,764,592	$11,145.32	$928.78	0.6%
Rate 200	1	186	-	-	-	-	-	-
Rate 300	2	30	-	-	-	-	-	-

*The average monthly bill impact of DSM for Rate 1 customers inclusive of the maximum potential shareholder incentive is forecasted to be $2.11.

Witnesses: R. Idenouye
S. Moffat
F. Oliver-Glasford
B. Ott
R. Sigurdson

Table 7: 2018 Rate Allocation of DSM Budget

2018 DSM Budget - Forecasted Rate Allocation ($ millions)				
Rate Class	**DSM Budget less Low Income**	**Low Income Budget**	**Total DSM Budget**	**Shareholder Incentive @ 100% Target ($ million)**
Rate 1	$39.80	$7.91	**$47.71**	$2.50
Rate 6	$24.62	$3.28	**$27.89**	$1.46
Rate 9	$0.00	$0.00	**$0.00**	$0.00
Rate 110	$1.18	$0.12	**$1.30**	$0.07
Rate 115	$1.20	$0.07	**$1.27**	$0.07
Rate 125	$0.03	$0.09	**$0.12**	$0.01
Rate 135	$0.30	$0.01	**$0.31**	$0.02
Rate 145	$0.45	$0.07	**$0.52**	$0.03
Rate 170	$0.45	$0.06	**$0.51**	$0.03
Rate 200	$0.01	$0.03	**$0.04**	$0.00
Rate 300	$0.00	$0.01	**$0.01**	$0.00
TOTAL	**$68.04**	**$11.64**	**$79.68**	**$4.18**

Witnesses: R. Idenouye
S. Moffat
F. Oliver-Glasford
B. Ott
R. Sigurdson

Table 8: 2018 System Characteristics and Bill Impacts

2018 System Characteristics and Bill Impact - Forecasted Rate Allocation								
Rate Class	**Number of Customers**	**Gas Consumption/ Throughput (10^6m^3)**	**Annual Volume for Typical Customer (m3)**	**Average Annual Effective Rate ($/m3)**	**Annual Bill for Typical Customer**	**Average Annual Bill Impact of DSM per Customer**	**Average Monthly Bill Impact of DSM per Customer***	**Average Annual Bill Impact per Customer %**
Rate 1	2,039,257	4,709	2,400	$0.0107	$1,018	$25.60	$2.13	2.5%
Rate 6	165,389	4,660	22,606	$0.0063	$6,382	$142.43	$11.87	2.2%
Rate 9	8	1	-	-	-	-	-	-
Rate 110	191	620	598,568	$0.0022	$128,349	$1,324.02	$110.33	1.0%
Rate 115	27	472	4,471,609	$0.0028	$873,021	$12,640.57	$1,053.38	1.4%
Rate 125	5	0	-	-	-	-	-	-
Rate 135	41	56	598,567	$0.0058	$112,451	$3,470.27	$289.19	3.1%
Rate 145	101	163	598,568	$0.0034	$122,931	$2,014.69	$167.89	1.6%
Rate 170	34	453	9,976,120	$0.0012	$1,764,592	$11,832.10	$986.01	0.7%
Rate 200	1	186	-	-	-	-	-	-
Rate 300	2	30	-	-	-	-	-	-

*The average monthly bill impact of DSM for Rate 1 customers inclusive of the maximum potential shareholder incentive is forecasted to be $2.29.

Witnesses: R. Idenouye
S. Moffat
F. Oliver-Glasford
B. Ott
R. Sigurdson

Table 9: 2019 Rate Allocation of Bill Impacts

2019 DSM Budget - Forecasted Rate Allocation ($ millions)				
Rate Class	**DSM Budget less Low Income**	**Low Income Budget**	**Total DSM Budget**	**Shareholder Incentive @ 100% Target ($ million)**
Rate 1	$40.59	$8.07	**$48.66**	$2.50
Rate 6	$25.11	$3.34	**$28.46**	$1.46
Rate 9	$0.00	$0.00	**$0.00**	$0.00
Rate 110	$1.21	$0.12	**$1.33**	$0.07
Rate 115	$1.23	$0.07	**$1.29**	$0.07
Rate 125	$0.03	$0.09	**$0.12**	$0.01
Rate 135	$0.31	$0.01	**$0.32**	$0.02
Rate 145	$0.46	$0.07	**$0.53**	$0.03
Rate 170	$0.46	$0.06	**$0.52**	$0.03
Rate 200	$0.01	$0.03	**$0.04**	$0.00
Rate 300	$0.00	$0.01	**$0.01**	$0.00
TOTAL	**$69.40**	**$11.87**	**$81.27**	**$4.18**

Witnesses: R. Idenouye
S. Moffat
F. Oliver-Glasford
B. Ott
R. Sigurdson

Table 10: 2019 System Characteristics and Bill Impacts

2019 System Characteristics and Bill Impact - Forecasted Rate Allocation								
Rate Class	**Number of Customers**	**Gas Consumption/ Throughput (10^6m^3)**	**Annual Volume for Typical Customer (m3)**	**Average Annual Effective Rate ($/m3)**	**Annual Bill for Typical Customer**	**Average Annual Bill Impact of DSM per Customer**	**Average Monthly Bill Impact of DSM per Customer***	**Average Annual Bill Impact per Customer %**
Rate 1	2,039,257	4,709	2,400	$0.0109	$1,018	$26.08	$2.17	2.6%
Rate 6	165,389	4,660	22,606	$0.0064	$6,382	$145.17	$12.10	2.3%
Rate 9	8	1	-	-	-	-	-	-
Rate 110	191	620	598,568	$0.0023	$128,349	$1,349.19	$112.43	1.1%
Rate 115	27	472	4,471,609	$0.0029	$873,021	$12,880.87	$1,073.41	1.5%
Rate 125	5	0	-	-	-	-	-	-
Rate 135	41	56	598,567	$0.0059	$112,451	$3,536.24	$294.69	3.1%
Rate 145	101	163	598,568	$0.0034	$122,931	$2,052.99	$171.08	1.7%
Rate 170	34	453	9,976,120	$0.0012	$1,764,592	$12,057.03	$1,004.75	0.7%
Rate 200	0	186	-	-	-	-	-	-
Rate 300	2	30	-	-	-	-	-	-

*The average monthly bill impact of DSM for Rate 1 customers inclusive of the maximum potential shareholder incentive is forecasted to be $2.33.

Witnesses: R. Idenouye
S. Moffat
F. Oliver-Glasford
B. Ott
R. Sigurdson

Table 11: 2020 Rate Allocation of DSM Budget

2020 DSM Budget - Forecasted Rate Allocation ($ millions)				
Rate Class	**DSM Budget less Low Income**	**Low Income Budget**	**Total DSM Budget**	**Shareholder Incentive @ 100% Target ($ million)**
Rate 1	$41.39	$8.23	**$49.63**	$2.50
Rate 6	$25.62	$3.41	**$29.03**	$1.46
Rate 9	$0.00	$0.00	**$0.00**	$0.00
Rate 110	$1.23	$0.12	**$1.35**	$0.07
Rate 115	$1.25	$0.07	**$1.32**	$0.07
Rate 125	$0.03	$0.09	**$0.12**	$0.01
Rate 135	$0.32	$0.01	**$0.32**	$0.02
Rate 145	$0.46	$0.08	**$0.54**	$0.03
Rate 170	$0.47	$0.06	**$0.53**	$0.03
Rate 200	$0.01	$0.03	**$0.04**	$0.00
Rate 300	$0.00	$0.01	**$0.01**	$0.00
TOTAL	**$70.79**	**$12.11**	**$82.90**	**$4.18**

Witnesses: R. Idenouye
S. Moffat
F. Oliver-Glasford
B. Ott
R. Sigurdson

Table 12: 2020 System Characteristics and Bill Impacts

2020 System Characteristics and Bill Impact - Forecasted Rate Allocation								
Rate Class	Number of Customers	Gas Consumption/ Throughput ($10^6 m^3$)	Annual Volume for Typical Customer (m3)	Average Annual Effective Rate ($/m3)	Annual Bill for Typical Customer	Average Annual Bill Impact of DSM per Customer	Average Monthly Bill Impact of DSM per Customer*	Average Annual Bill Impact per Customer %
Rate 1	2,039,257	4,709	2,400	$0.0111	$1,018	$26.57	$2.21	2.6%
Rate 6	165,389	4,660	22,606	$0.0065	$6,382	$147.96	$12.33	2.3%
Rate 9	8	1	-	-	-	-	-	-
Rate 110	191	620	598,568	$0.0023	$128,349	$1,374.86	$114.57	1.1%
Rate 115	27	472	4,471,609	$0.0029	$873,021	$13,125.97	$1,093.83	1.5%
Rate 125	5	0	-	-	-	-	-	-
Rate 135	41	56	598,567	$0.0060	$112,451	$3,603.53	$300.29	3.2%
Rate 145	101	163	598,568	$0.0035	$122,931	$2,092.05	$174.34	1.7%
Rate 170	34	453	9,976,120	$0.0012	$1,764,592	$12,286.46	$1,023.87	0.7%
Rate 200	0	186	-	-	-	-	-	-
Rate 300	2	30	-	-	-	-	-	-

*The average monthly bill impact of DSM for Rate 1 customers inclusive of the maximum potential shareholder incentive is forecasted to be $2.37.

Witnesses: R. Idenouye
S. Moffat
F. Oliver-Glasford
B. Ott
R. Sigurdson

Low Income Accounting Treatment

5. In accordance with past practice, Enbridge will allocate the Low Income DSM budget such that it is funded from all rate classes[1], in a manner consistent with the electricity conservation and demand management framework, as well as the Board's Low-Income Energy Assistance Program ("LEAP"). Allocation for the LEAP fund was outlined in EB-2008-0150 Report of the Board: Low Income Energy Assistance.

[1] Rates 9, 125, 200 & 300 will not have any LRAM component included in the rate allocation since customers in these rates classes are not eligible for DSM programs. These rate classes will however, be subject to rate allocations for DSMVA and applicable DSMIDA related to the Low Income Program.

AVOIDED COSTS

Avoided Gas Costs

1. Within Enbridge's Gas Distribution Inc.'s ("Enbridge" or the "Company") update to its 2012 to 2014 DSM Plan, the Company submitted avoided cost calculations for natural gas, water and electricity for 2012.[1] In accordance with the 2012 to 2014 Demand Side Management Guidelines ("DSM") for Natural Gas Utilities, Section 6.2.1, the Company updated the commodity portion of these avoided costs in the fourth quarter of each year for application to the next year. Updated avoided commodity costs for 2013 were included in Enbridge's 2013 Final DSM Annual Report and filed with the Ontario Energy Board (the "Board") under EB-2014-0277, the Company's 2013 DSM Clearance of Accounts application.

2. Given that 2015 is the beginning of a new multi-year plan, the Company is undertaking a complete update of the avoided natural gas costs, inclusive of the costs for transportation and storage in addition to commodity costs. This update will follow the methodology outlined in the Board's EB-2014-0134, *Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020*) and will be filed with the Board by the Q4, 2015.

3. In 2014, the Company engaged Navigant Consulting Ltd., to conduct a Distribution Avoided Cost Study. The study is attached as Exhibit C, Tab 1, Schedule 4. The results of the study have been incorporated into the avoided costs for 2015. The distribution avoided costs that are detailed in 2015 will continue for the duration of the multi-year plan in accordance with the methodology approved in the DSM Guidelines for Natural Gas Utilities EB-2008-0346, Section 6.2.1.

[1] EB-2012-0394, Exhibit B, Tab 2, Schedule 2

4. The Company is currently reviewing an alternate approach to the incorporation of a long term market forecast for natural gas commodity prices into its avoided costs. This potential change would extend avoided cost estimates for the final 20 years of the program impacts. As stated above, final 2015 avoided costs will be filed by Q4, 2015.

Avoided Electricity Costs

5. Avoided electricity costs have been updated utilizing the same methodology used within previous DSM plans. The avoided electricity costs are based on the wholesale price of electricity as reported in the Annual Report of the Independent Electricity System Operator ("IESO"). The avoided electricity costs represent the wholesale cost of electricity (i.e., the cost of the commodity price plus wholesale market services, transmission and debt retirement charges which are passed from the IESO to the LDCs). The values represent the latest full year of data available from the IESO (January 2014 to December 2014). Forecast values are adjusted for the Consumer Price Index.

Avoided Water Costs

6. Avoided water costs have been updated utilizing the same methodology used within previous DSM plans. The avoided water costs were updated with information provided by York Region, City of Toronto, Ottawa, and Niagara Region. A weighted average cost was developed by applying the number of customers in each region to the water costs in each region. For subsequent years the values are adjusted for the Consumer Price Index.

7. The values represent the latest full year data available from the various regions (April 2014 to March 2015).

		2015 Gas Avoided Costs															
		Water Heating				Space Heating				Combined Space & Water Heating				Industrial			
Year		Baseload ($/m3)				Baseload ($/m3)				Baseload ($/m3)				Baseload ($/m3)			
		Rate	NPV without Distribution Adder	Distribution Adder	NPV with Distribuiton Adder	Rate	NPV without Distribution Adder	Distribution Adder	NPV with Distribuiton Adder	Rate	NPV without Distribution Adder	Distribution Adder	NPV with Distribuiton Adder	Rate	NPV without Distribution Adder	Distribution Adder	NPV with Distribuiton Adder
1	2015	0.14716	$0.147	0.00328	$0.150	0.15456	$0.155	0.01206	$0.167	0.15340	$0.153	0.01109	$0.16	0.14762	$0.148	0.00345	$0.151
2	2016	0.18823	$0.328	0.00328	$0.331	0.19937	$0.346	0.01206	$0.358	0.19756	$0.343	0.01109	$0.35	0.18910	$0.329	0.00345	$0.333
3	2017	0.20373	$0.517	0.00328	$0.520	0.21389	$0.544	0.01206	$0.556	0.21202	$0.539	0.01109	$0.55	0.20498	$0.519	0.00345	$0.522
4	2018	0.21441	$0.707	0.00328	$0.710	0.22504	$0.744	0.01206	$0.756	0.22307	$0.738	0.01109	$0.75	0.21589	$0.711	0.00345	$0.714
5	2019	0.22831	$0.902	0.00328	$0.906	0.24019	$0.949	0.01206	$0.961	0.23788	$0.941	0.01109	$0.95	0.22969	$0.907	0.00345	$0.911
6	2020	0.25175	$1.109	0.00328	$1.112	0.28898	$1.187	0.01206	$1.199	0.28386	$1.174	0.01109	$1.19	0.25396	$1.116	0.00345	$1.119
7	2021	0.26734	$1.320	0.00328	$1.324	0.28503	$1.412	0.01206	$1.424	0.28193	$1.397	0.01109	$1.41	0.26925	$1.329	0.00345	$1.332
8	2022	0.27076	$1.526	0.00328	$1.530	0.28867	$1.632	0.01206	$1.644	0.28553	$1.614	0.01109	$1.63	0.27269	$1.536	0.00345	$1.539
9	2023	0.26142	$1.717	0.00328	$1.721	0.27871	$1.835	0.01206	$1.847	0.27568	$1.816	0.01109	$1.83	0.26328	$1.728	0.00345	$1.732
10	2024	0.25432	$1.896	0.00328	$1.899	0.27115	$2.026	0.01206	$2.038	0.26820	$2.004	0.01109	$2.02	0.25614	$1.908	0.00345	$1.912
11	2025	0.25941	$2.071	0.00328	$2.074	0.27657	$2.213	0.01206	$2.225	0.27356	$2.189	0.01109	$2.20	0.26126	$2.085	0.00345	$2.088
12	2026	0.26460	$2.243	0.00328	$2.246	0.28210	$2.396	0.01206	$2.408	0.27903	$2.370	0.01109	$2.38	0.26649	$2.258	0.00345	$2.261
13	2027	0.26989	$2.412	0.00328	$2.415	0.28774	$2.575	0.01206	$2.588	0.28462	$2.548	0.01109	$2.56	0.27182	$2.428	0.00345	$2.431
14	2028	0.27529	$2.577	0.00328	$2.580	0.29350	$2.752	0.01206	$2.764	0.29031	$2.722	0.01109	$2.73	0.27725	$2.594	0.00345	$2.598
15	2029	0.28079	$2.739	0.00328	$2.742	0.29937	$2.925	0.01206	$2.937	0.29611	$2.893	0.01109	$2.90	0.28280	$2.758	0.00345	$2.761
16	2030	0.28641	$2.898	0.00328	$2.901	0.30536	$3.094	0.01206	$3.106	0.30204	$3.061	0.01109	$3.07	0.28845	$2.918	0.00345	$2.921
17	2031	0.29214	$3.054	0.00328	$3.057	0.31146	$3.260	0.01206	$3.273	0.30808	$3.225	0.01109	$3.24	0.29422	$3.075	0.00345	$3.078
18	2032	0.29798	$3.207	0.00328	$3.210	0.31769	$3.424	0.01206	$3.436	0.31424	$3.387	0.01109	$3.40	0.30011	$3.229	0.00345	$3.232
19	2033	0.30394	$3.357	0.00328	$3.360	0.32405	$3.584	0.01206	$3.596	0.32052	$3.545	0.01109	$3.56	0.30611	$3.380	0.00345	$3.383
20	2034	0.31002	$3.504	0.00328	$3.508	0.33053	$3.740	0.01206	$3.752	0.32693	$3.700	0.01109	$3.71	0.31223	$3.528	0.00345	$3.532
21	2035	0.31622	$3.649	0.00328	$3.652	0.33714	$3.894	0.01206	$3.906	0.33347	$3.852	0.01109	$3.86	0.31848	$3.673	0.00345	$3.677
22	2036	0.32254	$3.790	0.00328	$3.793	0.34388	$4.045	0.01206	$4.057	0.34014	$4.002	0.01109	$4.01	0.32485	$3.816	0.00345	$3.819
23	2037	0.32900	$3.929	0.00328	$3.932	0.35076	$4.193	0.01206	$4.205	0.34694	$4.148	0.01109	$4.16	0.33134	$3.956	0.00345	$3.959
24	2038	0.33558	$4.065	0.00328	$4.068	0.35777	$4.338	0.01206	$4.350	0.35388	$4.292	0.01109	$4.30	0.33797	$4.093	0.00345	$4.096
25	2039	0.34229	$4.199	0.00328	$4.202	0.36493	$4.481	0.01206	$4.493	0.36096	$4.432	0.01109	$4.44	0.34473	$4.227	0.00345	$4.231
26	2040	0.34913	$4.330	0.00328	$4.333	0.37223	$4.620	0.01206	$4.632	0.36818	$4.570	0.01109	$4.58	0.35162	$4.359	0.00345	$4.363
27	2041	0.35611	$4.458	0.00328	$4.461	0.37967	$4.757	0.01206	$4.769	0.37554	$4.706	0.01109	$4.72	0.35866	$4.489	0.00345	$4.492
28	2042	0.36324	$4.584	0.00328	$4.587	0.38726	$4.892	0.01206	$4.904	0.38305	$4.839	0.01109	$4.85	0.36583	$4.616	0.00345	$4.619
29	2043	0.37050	$4.708	0.00328	$4.711	0.39501	$5.023	0.01206	$5.035	0.39072	$4.969	0.01109	$4.98	0.37315	$4.740	0.00345	$4.743
30	2044	0.37791	$4.829	0.00328	$4.832	0.40291	$5.153	0.01206	$5.165	0.39853	$5.097	0.01109	$5.11	0.38061	$4.862	0.00345	$4.866

Witnesses: S. Moffat
F. Oliver Glasford
R. Sigurdson

2015 Electricity and Water Avoided Costs

		Water Heating				Space Heating				Combined Space & Water Heating				Industrial			
Year		Electricity (¢/Kwh)		Water ($/1000 litre)		Electricity (¢/Kwh)		Water ($/1000 litre)		Electricity (¢/Kwh)		Water ($/1000 litre)		Electricity (¢/Kwh)		Water ($/1000 litre)	
		Rate	NPV	Rate	NPV	Rate	NPV	Rate	NPV	Rate	NPV	Rate	NPV	Rate	NPV	Rate	NPV
1	2015	0.11320	$0.11	2.75500	$2.76	0.11320	$0.11	2.75500	$2.76	0.11320	$0.11	2.75500	$2.76	0.11320	$0.11	2.75500	$2.76
2	2016	0.11574	$0.22	2.81682	$5.46	0.11574	$0.22	2.81682	$5.46	0.11574	$0.22	2.81682	$5.46	0.11574	$0.22	2.81682	$5.46
3	2017	0.11812	$0.33	2.87485	$8.12	0.11812	$0.33	2.87485	$8.12	0.11812	$0.33	2.87485	$8.12	0.11812	$0.33	2.87485	$8.12
4	2018	0.12056	$0.44	2.93407	$10.73	0.12056	$0.44	2.93407	$10.73	0.12056	$0.44	2.93407	$10.73	0.12056	$0.44	2.93407	$10.73
5	2019	0.12304	$0.55	2.99450	$13.29	0.12304	$0.55	2.99450	$13.29	0.12304	$0.55	2.99450	$13.29	0.12304	$0.55	2.99450	$13.29
6	2020	0.12557	$0.65	3.05618	$15.80	0.12557	$0.65	3.05618	$15.80	0.12557	$0.65	3.05618	$15.80	0.12557	$0.65	3.05618	$15.80
7	2021	0.12816	$0.75	3.11912	$18.27	0.12816	$0.75	3.11912	$18.27	0.12816	$0.75	3.11912	$18.27	0.12816	$0.75	3.11912	$18.27
8	2022	0.13080	$0.85	3.18336	$20.69	0.13080	$0.85	3.18336	$20.69	0.13080	$0.85	3.18336	$20.69	0.13080	$0.85	3.18336	$20.69
9	2023	0.13349	$0.95	3.24892	$23.06	0.13349	$0.95	3.24892	$23.06	0.13349	$0.95	3.24892	$23.06	0.13349	$0.95	3.24892	$23.06
10	2024	0.13624	$1.04	3.31584	$25.39	0.13624	$1.04	3.31584	$25.39	0.13624	$1.04	3.31584	$25.39	0.13624	$1.04	3.31584	$25.39
11	2025	0.13905	$1.14	3.38413	$27.68	0.13905	$1.14	3.38413	$27.68	0.13905	$1.14	3.38413	$27.68	0.13905	$1.14	3.38413	$27.68
12	2026	0.14191	$1.23	3.45383	$29.92	0.14191	$1.23	3.45383	$29.92	0.14191	$1.23	3.45383	$29.92	0.14191	$1.23	3.45383	$29.92
13	2027	0.14484	$1.32	3.52496	$32.12	0.14484	$1.32	3.52496	$32.12	0.14484	$1.32	3.52496	$32.12	0.14484	$1.32	3.52496	$32.12
14	2028	0.14782	$1.41	3.59756	$34.28	0.14782	$1.41	3.59756	$34.28	0.14782	$1.41	3.59756	$34.28	0.14782	$1.41	3.59756	$34.28
15	2029	0.15086	$1.50	3.67166	$36.40	0.15086	$1.50	3.67166	$36.40	0.15086	$1.50	3.67166	$36.40	0.15086	$1.50	3.67166	$36.40
16	2030	0.15397	$1.58	3.74728	$38.48	0.15397	$1.58	3.74728	$38.48	0.15397	$1.58	3.74728	$38.48	0.15397	$1.58	3.74728	$38.48
17	2031	0.15714	$1.67	3.82445	$40.52	0.15714	$1.67	3.82445	$40.52	0.15714	$1.67	3.82445	$40.52	0.15714	$1.67	3.82445	$40.52
18	2032	0.16038	$1.75	3.90322	$42.53	0.16038	$1.75	3.90322	$42.53	0.16038	$1.75	3.90322	$42.53	0.16038	$1.75	3.90322	$42.53
19	2033	0.16368	$1.83	3.98362	$44.49	0.16368	$1.83	3.98362	$44.49	0.16368	$1.83	3.98362	$44.49	0.16368	$1.83	3.98362	$44.49
20	2034	0.16705	$1.91	4.06566	$46.42	0.16705	$1.91	4.06566	$46.42	0.16705	$1.91	4.06566	$46.42	0.16705	$1.91	4.06566	$46.42
21	2035	0.17049	$1.99	4.14940	$48.32	0.17049	$1.99	4.14940	$48.32	0.17049	$1.99	4.14940	$48.32	0.17049	$1.99	4.14940	$48.32
22	2036	0.17401	$2.06	4.23488	$50.18	0.17401	$2.06	4.23488	$50.18	0.17401	$2.06	4.23488	$50.18	0.17401	$2.06	4.23488	$50.18
23	2037	0.17759	$2.14	4.32211	$52.00	0.17759	$2.14	4.32211	$52.00	0.17759	$2.14	4.32211	$52.00	0.17759	$2.14	4.32211	$52.00
24	2038	0.18125	$2.21	4.41115	$53.79	0.18125	$2.21	4.41115	$53.79	0.18125	$2.21	4.41115	$53.79	0.18125	$2.21	4.41115	$53.79
25	2039	0.18498	$2.28	4.50202	$55.55	0.18498	$2.28	4.50202	$55.55	0.18498	$2.28	4.50202	$55.55	0.18498	$2.28	4.50202	$55.55
26	2040	0.18879	$2.35	4.59476	$57.27	0.18879	$2.35	4.59476	$57.27	0.18879	$2.35	4.59476	$57.27	0.18879	$2.35	4.59476	$57.27
27	2041	0.19268	$2.42	4.68941	$58.96	0.19268	$2.42	4.68941	$58.96	0.19268	$2.42	4.68941	$58.96	0.19268	$2.42	4.68941	$58.96
28	2042	0.19665	$2.49	4.78601	$60.62	0.19665	$2.49	4.78601	$60.62	0.19665	$2.49	4.78601	$60.62	0.19665	$2.49	4.78601	$60.62
29	2043	0.20070	$2.56	4.88461	$62.25	0.20070	$2.56	4.88461	$62.25	0.20070	$2.56	4.88461	$62.25	0.20070	$2.56	4.88461	$62.25
30	2044	0.20484	$2.62	4.98523	$63.85	0.20484	$2.62	4.98523	$63.85	0.20484	$2.62	4.98523	$63.85	0.20484	$2.62	4.98523	$63.85

Witnesses: S. Moffat
F. Oliver Glasford
R. Sigurdson

INPUT ASSUMPTIONS

1. In the previous Demand Side Management ("DSM") Guidelines for Natural Gas Utilities (EB-2008-0346), the Ontario Energy Board (the "Board") directed the utilities to make an annual application to update approved input assumptions and encouraged the utilities to file a joint application.

2. The "input assumptions" application typically contains a Table of Measure Assumptions; Substantiation Sheets; and a Custom Measure Life Guide; and contains information such as prescriptive input assumptions and free ridership values for select offers. As per EB-2008-0346, the input assumptions have been prepared and filed jointly by Enbridge Gas Distribution Inc. ("Enbridge") and Union Gas Limited ("Union") as a common reference document for natural gas DSM measures. Where a filing includes updated or revised input assumptions, substantiation sheets are included as evidentiary support.

3. The most recent filing was made on March 27, 2015. Union filed the New and Updated DSM Measures application (EB-2014-0354) on behalf of both Enbridge and Union. The joint application, contained all previously Board-approved prescriptive DSM input assumptions (e.g. measure life; electrical savings; natural gas savings; free ridership values) as well as updated prescriptive DSM input assumptions endorsed by the Technical Evaluation Committee ("TEC") as part of the current Technical Reference Manual project as per the *Joint Terms of Reference on Stakeholder Engagement* (2012 to 2014 DSM Framework).

4. The Technical Reference Manual is scheduled for completion at the end of Q2 2015, at which time, the remainder of the outstanding input assumptions and related substantiation documents will be filed with the Board for approval.

Witnesses: F. Oliver-Glasford
R. Sigurdson
T. Whitehead
A. Zaidi

5. This 2015 to 2020 Multi-Year Application is based on the new and updated DSM Measures Application (EB-2014-0354) filed on March 27th, 2015. To the extent necessary, Enbridge relies upon and adopts the new and updated measures set out in the EB-2014-0354 filing as part of this Application.

Witnesses: F. Oliver-Glasford
R. Sigurdson
T. Whitehead
A. Zaidi

PROSPECTIVE STAKEHOLDERING

1. Enbridge Gas Distribution Inc. ("Enbridge" or the "Company") has a long standing history of seeking input from both intervenors and key stakeholders to inform, improve, evaluate and better implement its demand side management programs ("DSM") programs. Enbridge has worked with intervenors regularly and in many forums including DSM Consultative, Audit Committee ("AC"), and Technical Evaluation Committee ("TEC") meetings. The Company has also worked with intervenors prior to and in the context of applications to the Ontario Energy Board (the "Board") often generating settlement agreements evidencing the support and agreement with the Company's DSM programs and results. The Company also consults with intervenors on an informal basis to achieve outcomes and inform program design as appropriate, which in many instances have been positive. More broadly, in development of both the 2012 to 2014 DSM Plan and this Application, the Company has engaged a wide variety of stakeholders for the purpose of soliciting input and feedback on the past, present and future of DSM in Ontario.

2. In the Boards EB-2014-0134 *Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020)* ("DSM Framework") the Board states the following in respect to the stakeholder input and the consultation process:

> Consistent with the Board's consumer-centric approach, the gas utilities are expected to engage their stakeholders and conduct meaningful consultations to gather input and feedback on prospective DSM programs and other relevant areas of their multi-year DSM plans. The Board will not mandate the nature of this consultation, but will expect details to be provided in any application for approval of multi-year DSM plans. The Board has outlined various options earlier in this report where its involvement in various functions related to the DSM framework will be

> expanded. Although the Board's role will be increased, primarily with respect to oversight related to the evaluation process and annual updates to the input assumptions list, the Board continues to see the direct involvement of all key stakeholders, notably the gas utilities and intervenors with the required expertise, to be critical and necessary to ensure all elements of the gas utilities' multi-year DSM plans are considered during the program development, approval and evaluation stages.[1]

3. Concurrent with the Board's release of its *Draft Report of the Board: Demand Side Management Framework for Natural Gas Distributors*, dated September 15, 2014 (EB-2014-0134) ("Draft Framework"), Enbridge conducted a robust set of direct stakeholder engagement sessions regarding its Multi-Year DSM Plan. Seven sessions in September and October of 2014 brought together customers, business partners, intervenors, industry experts, and other stakeholders for detailed, sector specific discussions regarding Enbridge's forthcoming multi-year plan programs. The full details of these multi-year stakeholder consultation activities can be found in the Retrospective Stakeholdering Exhibit B, Tab 3, Schedule 2 of this Application.

4. Further to the Board's customer-centric approach and the success past engagement sessions, Enbridge supports the formalization of recurring stakeholdering activities with customers, channel partners, industry experts and delivery agents in order to receive ongoing insight and feedback on program design. Consistent with the past, this approach should continue to provide sound advice and tangible solutions from the marketplace. This will help ensure that DSM programs best meet the needs of Enbridge's customers.

[1] EB-2014-0134 - *"Report of the Board: Demand Side Management for Natural Gas Distributors (2015-2020)",* December 22, 2014,Section 14.0, Stakeholder Consultation, p. 36

5. Based on the excerpt from the DSM Framework below, Enbridge understands that the Board will be taking a more active role in providing guidance in the evaluation and audit process:

> The Board is of the view that it is in the best position to coordinate the evaluation process throughout the DSM framework period (i.e., 2015 to 2020). A process coordinated by the Board, in collaboration with the gas utilities, and supported by stakeholders with technical expertise, will be one that results in a thorough evaluation of DSM programs in an efficient manner.[2]

6. In the same document, the Board further indicated its intention to take on a similar role with respect to the updating of input assumptions; a task currently guided by the TEC. Board Staff have indicated to the gas utilities and intervenors that the Board will be offering further direction on evaluation processes in the very near future. The Board itself states at page 16 of the *Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015 to 2020)*)

> The Board will set out the specific roles and responsibilities for the parties involved in the different steps of the evaluation and audit process in a future correspondence.

7. Enbridge believes it is appropriate to identify the key criteria and objectives which should inform the development of the future evaluation and input updating processes. Enbridge suggests that any future stakeholdering processes should be:

   (a) Transparent and open;

   (b) For evaluation work, heavily weighted on members with objective evaluation and technical expertise, but inclusive of an intervenor(s), the gas utilities and Board staff;

[2] Ibid., Section 7.2, p. 30

Witnesses: M. Lister
F. Oliver-Glasford
R. Sigurdson

(c) For audit work, similar to the productive current process of the Audit Committee which is comprised of intervenors and the Company, but in future should also include Board Staff;

(d) For program design, and include a broader range of stakeholders in discussions to promote a more inclusive and continuously improving dialogue;

(e) Include Board Staff as an active member and/or coordinator on various committees and during stakeholder engagement activities;

(f) Scale the level of stakeholder engagement and Board oversight activities relative to the risks and rate/customer impacts. Stated differently, the resources and level of effort that is invested should be commensurate with the nature and potential impact of an issue;

(g) Cognizant of the concerns and investment of time of parties to help foster constructive working relationships, groups and committees;

(h) Accommodating so as to allow differences to be communicated; and

(i) Consensus oriented by striving for mutual wins or productive compromises. While achieving a consensus is a goal, it may not always be possible. In such a case, the Company, as the entity ultimately accountable for its DSM activities, must have the ability to determine that sufficient effort has been employed attempting to reach a consensus and that further efforts are not likely to produce results.

8. In Enbridge's Response dated October 15, 2014 to the Draft Framework, the Company submitted the following in respect of the Board's apparent new role in the evaluation and audit processes. The views expressed below continue to hold true today.

> Enbridge is supportive of the Board's decision to take on a coordination role in the evaluation and verification of DSM impacts and results. It is the view of the Company that the evaluation and audit processes that have evolved between the launch of DSM and present day are not only robust but open and transparent…. In this new Framework, it is understood that utilities would continue to provide information and clarification for third party verification and audit firms, throughout the

> process. The utilities would also continue to act as the point of contact for customers and program participants, as they conduct their reviews and intervenors would continue to add value by providing input on behalf of the interests which they represent. This continued role for the utilities and stakeholders may be in the form of an audit committee, similar to today, with clear timelines, roles and accountabilities.[3]

The Company further submitted:

> Enbridge is not opposed to the Board's coordination of updating input assumptions provided that the utilities' intelligence of the marketplace is amply leveraged in the process and intervenors are afforded the opportunity to provide input.[4]

9. The Company looks forward to receiving the details of and working with the Board and Board Staff once the Board issues further guidance on the future audit and evaluation processes.

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[3] EB-2014-0134 Response to the Reports from the Ontario Energy Board: Draft Report of the Board: Demand Side Management Framework for Natural Gas Distributors, Draft Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors", Submission From Enbridge Gas Distribution Inc., Oct. 15, 2014, p. 25 of 34

[4] Ibid. p. 26 of 34

Witnesses: M. Lister
F. Oliver-Glasford
R. Sigurdson

RETROSPECTIVE CONSULTATION

1. This Exhibit reports on the stakeholder consultation process in support of the Company's Multi-Year DSM Plan Application and provides a summary of the discussions held during the stakeholder sessions in the fall of 2014 and early 2015, as well as feedback from the Enbridge Customer Forum Panel.

2. Enbridge Gas Distribution Inc. ("Enbridge" or the "Company") sought stakeholder input in several sectors, including: residential, low income, commercial, industrial, and the new construction market.

3. The objective of these stakeholder sessions was two-fold:

   i. To gain input and feedback from the Company's customers and other interested parties in an effort to enhance program offerings in the Company's multi-year planning process; and,

   ii. To inform stakeholders about the range of offerings being considered in the Company's Multi-Year DSM Plan. Enbridge program staff attended all stakeholder sessions and listened to all of the viewpoints and feedback shared. The input received during the consultation sessions was synthesized and considered in program offer design. The consultation sessions consisted of presentations of information to stakeholders followed by third party facilitated discussions. In addition, Enbridge staff was available for informal discussions with participants throughout and after the sessions.

4. In total, there were seven sessions involving customers, stakeholder groups, business partners, local electricity distribution companies ("LDCs"), various associations and governmental organizations (Natural Resources Canada

Witnesses:

Witnesses:	S. Bertuzzi	D. Naden
	P. Goldman	F. Oliver-Glasford
	R. Kennedy	B. Ott
	M. Lister	J. Paris
	E. Lontoc	E. Reimer
	S. Mills	R. Sigurdson

("NRCan"), Board Staff, the Ministry of Energy ("MOE"), and the Independent Electricity System Operator ("IESO")). Enbridge believes that the organizations and individuals invited to these sessions provided a solid representation and cross-section of the interests of the majority of its ratepayers and stakeholders.

5. Focused sessions were held on the following dates:

2014	
September 16	Home Health Record (OPower) – Residential Behavioural session
September 24	Prescriptive, Direct Install, Custom, Business Market session
September 25	Behavioural Residential Design session
October 3	Run it Right and Energy Management – Commercial and Industrial session
October 7	Ottawa – Residential / Low Income / New Construction & Municipality
October 22	Municipality and New Construction
2015	
January 8	Financing – Discovery and Discussion session

** In addition to these seven sessions, Enbridge held a September 11 Low Income Stakeholder Session in collaboration with Union. And, on December 2 a full DSM Consultative session was held.*

6. Intervenor organizations were also invited to these sessions, dependent on the topic and/or rate class representation. Intervenor input regarding multi-year programming was also facilitated via the consultation meetings held in December 2013, December 2014, and in January, February and March of 2015.

Witnesses:		
	S. Bertuzzi	D. Naden
	P. Goldman	F. Oliver-Glasford
	R. Kennedy	B. Ott
	M. Lister	J. Paris
	E. Lontoc	E. Reimer
	S. Mills	R. Sigurdson

7. As well, ongoing dialogue continues with intervenors and low income service organizations during the joint Union Gas Limited / Enbridge low income consultations held twice a year (the most recent being held in September 2014).

8. Further input is received from the intervenor and industry expert members of the Technical Evaluation Committee ("TEC") and through intervenor input and feedback provided during the extensive annual audit process

9. With Rate 1 residential customers making up the majority of its customer base, Enbridge felt it was important to solicit direct customer feedback with respect to its residential DSM offerings. This feedback and input was pursued through the Enbridge Customer Forum Panel. The Enbridge Customer Forum is a pre-recruited panel of residential customers. The panel allows for low-cost, quick turnaround customer research, compared to traditional market research methods. The panel is used to obtain feedback on a variety of topics such as energy efficiency programs, potential programs and services, communication feedback, customer service and safety.

<u>Summary of Results</u>

<u>Residential</u>

10. Stakeholder consultation with respect to the residential sector utilized a variety of forums to engage participants in the process. The stakeholder engagement sessions included business partners, builders and developers, LDCs, the IESO, associations, conservation authorities, municipalities, and governmental

organizations (NRCan, Board Staff and the MOE). These sessions were held in both Toronto and Ottawa.

11. One of the group stakeholder sessions was focused on Enbridge's My Home Health Record ("MHHR"). The MHHR offer is a behavioural and benchmarking offering being brought to market by working with a vendor named OPower. Enbridge anticipates rolling out MHHR to a large number of the Company's residential customer base. On this basis, this particular offer was deemed significant enough to warrant a dedicated session. Enbridge invited OPower staff to present at the Toronto session so that attendees had the opportunity to ask detailed questions regarding OPower's systems, roll out logistics and to hear about experiences with this type of program in other jurisdictions.

<u>Residential Key Themes</u>

12. With respect to the MHHR offer, the key themes that emerged from stakeholder consultations were:

- A desire to see an expansion into the residential market with an offering that would ramp up quickly to reach higher customer participation;
- The appropriateness of using the offer to promote other energy efficiency offers;
- The desirability of collaborating with LDCs and, if possible, municipal water entities with the goal of issuing one MHHR report.

13. The general residential stakeholder engagement sessions held in Toronto and Ottawa provided feedback on new directions that the Enbridge team could

consider to promote and enhance its current offerings. Feedback included support for:

- The notion of expanding the Home Energy Conservation (“HEC”), formerly known as the Community Energy Retrofit, offering franchise-wide;
- Further collaboration with LDCs and other partners to secure consistency of approach, messaging to consumers, and to drive participation;
- Consideration of a financing option;
- Continuation with the Home Labelling initiative, education, and outreach to homeowners to drive uptake;
- Using smart meters to promote social benchmarking and time-of-use technologies.

14. From the Enbridge Customer Forum Panel, Enbridge sought to determine: the importance that its customers placed on energy efficiency; motivations behind the implementation of energy efficiency measures; the level of support that they receive from the Company, and the messages from the Company’s efforts that customers have been developing about energy efficiency. This panel was convened to directly validate with residential customers some of the key messages that emerged from the general stakeholder sessions. For example, given that an expansion of the HEC offer province-wide and the expansion of the MHHR offer to a large customer base will require a materially larger budget, the Company wished to ensure that this expansion was truly what the residential market was expecting. In summary, the Enbridge Customer Forum Panel determined the following:

- Pursuing energy efficiency opportunities is supported by residential customers, with the majority looking for ways to reduce their energy costs;
- The majority of customers feel that there are still opportunities to improve energy efficiency in their homes;
- Customers are looking for energy efficiency information, however they do not feel that they should have to pay for this information;
- While the majority of customers are a least somewhat aware of Enbridge's efficiency incentives, it appears that customers would like more help in understanding energy efficiency options.

Low Income

15. The Low Income stakeholder engagement strategy has been ongoing since 2012, with both gas utilities holding joint consultation meetings twice per year. These meetings are structured to allow for plenary discussion as well as breakout sessions, where appropriate, to discuss matters specific to each utility. The meetings include intervenor representatives, as well as other industry stakeholders, with the overall focus of the consultation being program design and implementation rather than program status and regulatory matters. The objective of these consultation sessions is to allow intervenors and other stakeholders to provide their perspective on the delivery of current low income programming and input on potential future programming efforts.

16. In addition to these bi-annual low income stakeholder sessions, Enbridge sought further input from participants at the stakeholder engagement sessions, including a session that was held in Ottawa. Being the second largest urban centre in the

Company's franchise area, Enbridge believed it was important to receive and consider the perspective of Ottawa low income constituents.

17. Feedback from the participants was received concerning additional measures that could be offered with the current *Ontario Building Code*, Part 3 and Part 9 program offers to low income customers. Feedback was also received on what the Company might do to increase energy awareness and literacy and what networks and organizations could be valuable in identifying multi-residential low income candidates.

18. A few key themes emerged from these sessions, including:

- Pursuing a broader range of housing types, e.g., seniors, supportive housing, shelters;
- Recognizing and dealing with language barriers;
- Support in reaching low income rental occupants in houses and small buildings not owned by low income individuals and families, by working with the Ontario Renovates program, municipalities, school boards, and local tenancy boards, etc.;
- Creating whole-house tracking, including items such as water, and waste diversion, etc.;
- Potentially offering prescriptive offerings, such as adaptable thermostats, window film or pipe insulation, dependent on cost-effectiveness;
- Pursuing MHHR type offerings and/or other behavioural components.

Witnesses:	S. Bertuzzi	D. Naden
	P. Goldman	F. Oliver-Glasford
	R. Kennedy	B. Ott
	M. Lister	J. Paris
	E. Lontoc	E. Reimer
	S. Mills	R. Sigurdson

19. A Low Income New Construction offer concept was introduced at the session. Participants were invited to provide feedback and input as to how Enbridge could work with the affordable housing plans of municipalities to promote the offering and prevent lost opportunities. Participants indicated that Enbridge could:

- Conduct workshops with planners/development review staff who work with developers early on to communicate the programs;
- Given that a city service provider sees all applications for social housing, he/she could be a key point of contact to reach developers;
- Ensure that stacked townhouses qualify for programs, as this is the format that social housing will focus on;
- Work with funding organizations to encourage applications;
- Be prepared to do pilots which do not fit exactly into one of the pre-designed programs. In other words, “test” future options;
- Align with the directions provided by political leadership by helping municipal councils to be aware of the Company’s initiatives;
- Include a “savings by design lite” approach for social housing;
- Start now – don’t wait until 2016. Engage with the service managers now, as municipalities are currently planning allocations for the next two to six years.

Commercial and Industrial

20. A series of stakeholder meetings were conducted throughout September and October 2014 that were specific to the commercial and industrial sectors. The object of these sessions was to share Enbridge’s preliminary thinking on future

directions for offers in the business markets sector and to secure feedback on key programming aspects. Participants were also asked to identify opportunities to extend the reach and impact of education programs for Enbridge to consider.

Commercial Key Themes

21. Key concepts highlighted in these sessions included:

- Collaborating more effectively with Union Gas and LDC's to enable customers who span service areas to access one information source and to make it easier and quicker for a customer to secure relevant information, offer details, applications etc.;
- Integrate water, electricity, and gas into audits, education and incentives for small customers;
- Pursue small commercial customers on a sector specific basis with tailored information and education focusing on those sectors where there is low participation. Upfront incentives were suggested as a consideration that would work well for smaller customers;
- Collaborate with LDCs, the IESO, Union Gas, and associations such as CME;
- Educate the marketplace, especially through best practices and case studies;
- The importance of supporting services such as project management and student audits, partnering with other utilities and associations could enhance these services, which may benefit smaller commercial customers more than large. Develop a roving/embedded energy manager capability and use it as an apprenticeship program to build long term capabilities;

- Consider incentives focused on peak load management. Perhaps initiate pilots toward this end;
- Incent education offerings as well, based on impact;
- Enhance the Company's customer relationship management system, capturing more customer profile information to provide the ability to query sector trends and offer effectiveness. This should also allow the Company to target specific sectors and customer types.

22. Enbridge sought input on specific aspects and components of supporting service offers, such as a potential project management service, and a student audit program. Generally the feedback regarding project management services was seen as adding more value to smaller customers where the production manager may also be the maintenance manager. The student audit initiative was seen as being a useful service to smaller industrial customers, and there was some support for expansion. Participants in the stakeholder session felt that it was "right to pursue the objective of expanding people's skills and experience" and that Enbridge should be evaluating the effectiveness of the program when there was sufficient data to do so.

23. Participants were also asked to consider a direct install program which was "turnkey" to the customer where Enbridge would manage the process and hire the contractor, and where the customer would pay 50% of the project cost.

24. Stakeholder feedback around this type of direct install program centered around Enbridge's role in the market and included:

- "Nervousness" that Enbridge would be picking winners and losers for implementation, potentially narrowing the breadth of capability in the market;

- The risk of taking out a program delivery channel;

- While there may be circumstances where Enbridge would work with a short list of suppliers, generally it was felt that the Company should strive to build breadth of market capability;

- Enbridge should have a certification and training program of local suppliers to ensure quality, but should not focus on just a few contractors.

25. In response to this feedback and concerns from the business market community, Enbridge used the input as an opportunity to revisit the Direct Install offer, allowing this type of programming to be a means of empowering the contractor community. Enbridge plans to undertake an RFP process to select a group of contractors across the franchise area to help deliver the offering. It is contemplated however, that customers will also have the option of using a contractor of their own choosing.

Industrial Key Themes

26. The industrial stakeholder engagement sessions were held in tandem with those of the commercial sector. The objectives were similar and sought to share Enbridge's preliminary thinking on the future direction for offers in the business markets sector and to secure feedback on key programming aspects. Participants were also asked to identify opportunities to extend the reach and impact of education initiatives for Enbridge to consider.

Witnesses:	S. Bertuzzi	D. Naden
	P. Goldman	F. Oliver-Glasford
	R. Kennedy	B. Ott
	M. Lister	J. Paris
	E. Lontoc	E. Reimer
	S. Mills	R. Sigurdson

27. Key thoughts in respect to the industrial sector included:

- Providing smaller customers a framework to think about energy savings and create a plan, possibly leveraging ISO 50001, which focuses on continuous improvement and requires commitment from senior management;
- Pursuing smaller customers on a sector specific basis with tailored information and education by, amongst other things, focusing on those sectors with low participation;
- Collaborating more effectively with Union Gas and LDCs to enable customers who span the service areas to have consistent programming and messaging;
- Recognizing that incentives are still important to this group of customers;
- Consideration for working with individual customers to negotiate the incentive they need in order to pursue a project.

Energy Management

28. The role of energy management in Enbridge's offer portfolio was considered in a separate stakeholder session due to the expansiveness and complexity of these offers in the business market. Enbridge sought feedback on whether or not to broaden participation to medium sized commercial customers with its current Run it Right ("RiR") offer. It also sought feedback regarding the best way to secure greater implementation among customers who engage in the program and whether RiR should address all forms of energy. In the industrial sector, participants were asked to consider a Comprehensive Energy Management ("CEM") process / offer for more complex industrial and institutional customers.

Witnesses:		
	S. Bertuzzi	D. Naden
	P. Goldman	F. Oliver-Glasford
	R. Kennedy	B. Ott
	M. Lister	J. Paris
	E. Lontoc	E. Reimer
	S. Mills	R. Sigurdson

29. RiR specific feedback indicated that participants were generally supportive of the notion of expanding the scope of RiR and that Enbridge should:

- Increase the program's flexibility;
- Consider facilitating sector specific energy share groups by leveraging associations which have been running workshops;
- Ensure the person who provides the service has expertise in the sector;
- Develop different approaches to reach/provide data and support to smaller customers cost efficiently.

30. Participants at the energy management stakeholder engagement sessions were also asked to consider a CEM process / offer for more complex industrial and institutional customers. Participants were generally very supportive that such a program would help customers reduce their energy costs. However, there were a number of barriers identified for consideration within existing corporate culture that may inhibit adoption and/or success of energy efficiency.

31. Participants provided suggestions for overcoming these barriers. These included:

- Barrier - Senior management's belief that "we're already lean" and/or "we don't have the resources for such a project".

Suggestions to overcome barrier:

- Share performance data/results from comparable entities ("No one is as lean as they need to be in today's world");

Witnesses:	S. Bertuzzi	D. Naden
	P. Goldman	F. Oliver-Glasford
	R. Kennedy	B. Ott
	M. Lister	J. Paris
	E. Lontoc	E. Reimer
	S. Mills	R. Sigurdson

- Merchandise success stories internally when they do occur. Ensure management is aware of the results as they are achieved;
- Work with industry associations to gain broad based support;
- Incentives continue to be valuable tools to sell projects internally, in addition to tying projects into greenhouse gas reduction or corporate sustainability targets;

- Barrier - Lack of resources.

Suggestions to overcome barrier:

- Aggregate facilities into one group to overcome scarcity of resources in each facility;
- Work with/enable other resources to deliver the program (to extend the reach of Enbridge's resources);
- Develop a simple checklist outlining expected paybacks for a range of solutions. This would be a useful tool to generate discussion.

32. Participants were supportive of the RiR and CEM offers integrating all forms of energy.

New Construction

33. Similar to the Low Income New Construction stakeholder discussions, Enbridge sought to identify whether its proposed direction for the Savings by Design ("SBD") offers paired well with the sustainability plans of municipalities. Beyond this, Enbridge looked to receive input on whether or not the offers should be expanded to smaller builders and projects.

Witnesses:	S. Bertuzzi	D. Naden
	P. Goldman	F. Oliver-Glasford
	R. Kennedy	B. Ott
	M. Lister	J. Paris
	E. Lontoc	E. Reimer
	S. Mills	R. Sigurdson

34. Participants were generally supportive of the notion of expanding SBD, recognizing both the benefits and the challenges of doing so:

- The current requirement to have built 50 homes within the past year means that the program could be "tapped out" in certain areas in the coming years, as 85% of builders construct 10 homes or less. Broadening would extend the reach of this offer to rural/small urban builders as well;
- A concern arose that a greater number of small participants may lead to inefficiencies in delivery and require different mechanisms of delivery.

35. Participants were generally supportive of the notion of Commercial SBD expansion to allow for participation of smaller buildings (i.e. those less than 100 sq.ft.). However, there was some concern that expansion would end up diluting resources and increase spending, and that funding should be allocated to projects with the greatest potential for savings.

Conclusion

36. Enbridge initiated the stakeholder engagement and consultation process to gain input and feedback from customers and other interested parties, in an effort to enhance program offers and inform stakeholders about the range of offers being considered within the Company's upcoming Multi-Year DSM Plan. Enbridge believes that this process led to a heightened level of understanding amongst its programming staff regarding the challenges and opportunities available in their respective marketplaces and, where appropriate, the Company's offers have been revised to accommodate these learnings.

Witnesses:	S. Bertuzzi	D. Naden
	P. Goldman	F. Oliver-Glasford
	R. Kennedy	B. Ott
	M. Lister	J. Paris
	E. Lontoc	E. Reimer
	S. Mills	R. Sigurdson

37. Enbridge believes that its approach to consultation should evolve from a preparatory function for regulatory applications to a long-term, strategic channel for relationship-building, risk mitigation, municipal planning, and new business identification.

38. Enbridge found the stakeholder sessions and residential panel forums held in the fall of 2014 to be extremely informative and beneficial in the development of the Company's Multi-Year DSM Plan. Enbridge believes that the organizations and individuals invited to these sessions provided a solid representation of the interests of the majority of its rate payers. It is Enbridge's intention to continue to conduct sessions of this nature to inform offer strategies and prepare for the mid-term review of the DSM Plan by the Board.

Witnesses:		
	S. Bertuzzi	D. Naden
	P. Goldman	F. Oliver-Glasford
	R. Kennedy	B. Ott
	M. Lister	J. Paris
	E. Lontoc	E. Reimer
	S. Mills	R. Sigurdson

INTEGRATED RESOURCE PLANNING

1. Least Cost Planning, also known as Integrated Resource Planning ("IRP"), has been considered in the regulatory environment in Ontario since the early 1990s.

2. In 1991, the Ontario Energy Board (the "Board") issued a Discussion Paper[1] prior to commencing a generic proceeding into Least Cost Planning (later renamed Integrated Resource Planning). In 1993, after consultation with stakeholders and utilities, the Board issued EBO 169-III.[2] As an outcome of this proceeding, the Board found that:

> Once the utilities' DSM plans are implemented and sufficient experience is gained, the Board stated that it expects to proceed with a review of the utilities' supply-side policies, activities and expenditures, as well as the current policies on system expansion, to confirm that these are consistent with least-cost planning principles. Once the supply-side assessment is completed, the Board can proceed with the final phase of the IRP proceedings, i.e., the combination of DSM and supply-side management into an integrated resource plan.[3]

3. Between 1995 and the present, the gas utilities in Ontario have engaged in DSM activities, generating significant natural gas savings across all rate classes. During this period, the gas utilities have experienced changes to the regulatory environment which included the utilities working with stakeholders to establish budgets and targets to realize broad-based demand side management ("DSM") savings. While not a "formal" IRP approach, the Ontario model for the gas utilities is, in effect, comparable to the Energy Efficiency Resource Standards ("EERS") for utilities used in several U.S. jurisdictions following deregulation in the electricity

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[1] EBO-169-1 "*Report on Gas Integrated Resource Planning, Prepared for the Ontario Energy Board",* September 16, 1991
[2] EBO 169-III "*A Report on the Demand-Side Management aspects of Gas Integrated Resource Planning"*, July 23, 1993
[3] Ibid., p. 4

Witnesses: S. Mills
F. Oliver-Glasford
H. Thompson

sector. The main difference is that in Ontario, natural gas DSM activity is determined through a proceeding which includes all stakeholders rather than being mandated by a regulator. In the recent Board-issued , *Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020)* ("DSM Framework") (EB-2014-0134), the Board has influenced the extent of DSM activity by providing guidance for the determination of budgets, including budget maximums and allocations, such as for the low income sector.

4. Recently, attention in Ontario has turned to DSM in the context of infrastructure planning. During the EB-2012-0451 proceeding which involved the GTA Reinforcement Project, aspects of IRP and the role of DSM in infrastructure planning were raised. The Board found in that Decision that:

> In light of the evidence presented, the Board concludes that further examination of integrated resource planning for gas utilities is warranted. … this review is particularly timely given the recent provincial Long Term Energy plan. Further information on how the Board will examine gas integrated resource planning will be released in due course.[4]

5. In December 2013, the Minister of Energy issued a Long Term Energy Plan for Ontario, stating that:

> The Ministry will also work with the Ontario Energy Board (OEB) to incorporate the policy of Conservation first into distributor planning processes for both electricity and natural gas utilities.[5]

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[4] EB-2012-0451 Decision, January 30, 2014, pp. 46/47
[5] Ontario Ministry of Energy, Long Term Energy Plan, p. 4

Witnesses: S. Mills
F. Oliver-Glasford
H. Thompson

6. The Minister's Directive to the Board in March 2014 with respect to the DSM Guidelines indicated that:

> By January 1, 2015, the Board shall have considered and taken such steps as considered appropriate by the Board towards implementing the Government's policy of putting conservation first in Distributor and Gas Distributor infrastructure planning processes at the regional and local levels, where cost-effective and consistent with maintaining appropriate levels of reliability.[6]

7. The 2015 to 2020 DSM Framework issued by the Board on December 22, 2014, directs the gas utilities to each conduct a study, completed as soon as possible and no later than in time to inform the mid-term review of the 2015-2020 DSM Framework.[7] Further, the Board stated that it, "expects the gas utilities to consider the role of DSM in reducing and / or deferring future infrastructure investments far enough in advance of the infrastructure replacement or upgrade so that DSM can reasonably be considered as a possible alternative."[8]

8. The DSM Framework requires the utilities to file, as part of their 2015 to 2020 Multi-Year DSM Plan, a document which includes a preliminary scope of the study it plans to conduct and a preliminary transition plan that outlines how the gas utility plans to include DSM as part of its future infrastructure planning efforts.[9] In response to these requirements, Enbridge attaches at Exhibit C, Tab 1, Schedule 3, an outline of the scope of this study and the approach and method that Enbridge will undertake. It also includes a preliminary study timeline and a preliminary transition plan.

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[6] Minister's Directive to the Ontario Energy Board, 467/2014, March 26, 2014, s. 5, p. 3
[7] EB-2014-0134 "*Report of the Board: Demand Side Framework for Natural Gas Distributors (2015-2020)"*, December 22, 2014 p. 36
[8] Ibid.
[9] Ibid.

Witnesses: S. Mills
F. Oliver-Glasford
H. Thompson

9. This study will be completed prior to the mid-term review which, under the DSM Framework, is anticipated to be completed by June 1, 2018.

10. In an effort to promote a consistent methodological approach to the study, Enbridge has shared with Union Gas Limited its proposed study scope, timeline and transition plan. In addition, both utilities held a half-day discovery session dealing with IRP on January 12, 2015.

DSM POTENTIAL STUDY

1. In 2013, Enbridge Gas Distribution Inc. ("Enbridge" or the "Company") engaged Navigant Consulting Ltd., to conduct a Demand Side Management ("DSM") Potential Study (the "Potential Study") in an effort to inform program planning for the multi-year plan period. Subsequently, in the *Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015 to 2020)* (EB-2014-0134) the Ontario Energy Board (the "Board") indicated that it "expects that the gas utilities will rely on their most recent achievable potential studies, experience-to-date and projected market opportunities and constraints to inform the development of their annual and long-term natural gas savings targets."[1]

2. Enbridge's Potential Study, found at Exhibit C, Tab 1, Schedule 1, is intended to provide high level guidance and direction to policy makers, stakeholders and Enbridge regarding the level of savings that could reasonably be achieved in Enbridge's franchise area at different DSM budget levels. Though the level of Enbridge's endorsement of the report may vary amongst the specific areas examined, the Company finds the overall conclusions of the Potential Study to be directionally reasonable.

3. This Potential Study was but one input which informed the budgets and targets proposed in Enbridge's 2015 to 2020 DSM Multi-Year Plan. Other resources include, but are not necessarily limited to, utility market experience, program plans, historical results and budgets, and DSM Consultative intervenor input.

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[1] EB-2014-0134, "*Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015 – 2020)" December 22, 2014*, p. 2

Witnesses: J. DeVenz
M. Lister
S. Mills
F. Oliver Glasford
R. Sigurdson

4. It is the intention of Enbridge to conduct an update to the Potential Study in order to inform the midterm review in light of the Board's guidance that, "the mid-term review will be informed by a study of achievable potential for natural gas efficiency in Ontario to be completed by June 1, 2016."[2] Given that the Company would have been required to complete a full study prior to the above noted date and that the Potential Study has proven a helpful aid in establishing appropriate DSM targets, Enbridge believes the report was a prudent use of ratepayer funds.

5. Moving forward, Enbridge is also committed to conducting sector-focused, ground-up market research in collaboration with the Independent Electricity System Operator ("IESO"). The Company is currently an attendee to the IESO's Achievable Potential Study Working Groups.

<u>Intervenor Consultation</u>

6. Comments on the scope of work, the list of energy efficiency measures, the measure input assumptions, the draft technical potential report and the draft economic potential report were received from interested intervenors. In December 2014, a final draft DSM potential study was completed by Navigant and sent out to intervenors for input. Extensive intervenor feedback was received and Navigant prepared a "Responses to Stakeholder Comments" document found at Exhibit C, Tab 1, Schedule 2. Where appropriate, Navigant incorporated changes into the final DSM potential savings report based on intervenor feedback.

[2] EB-2014-0134, "*Report of the Board DSM Framework for Natural Gas Distributors 2015 – 2020*", p. 4

Witnesses: J. DeVenz
M. Lister
S. Mills
F. Oliver Glasford
R. Sigurdson

CARBON PRICING

1. In February 2015, Ontario's Ministry of the Environment and Climate Change ("MOECC") released a discussion paper entitled *Ontario's Climate Change Discussion Paper 2015* ("Discussion Paper"). The following excerpt can be found on page 38 of the Discussion Paper:

> This spring Ontario will confirm the mechanism or mechanisms that will be used to price carbon in Ontario.[1]

2. The above excerpt indicates that while the exact format is not yet known, it is the Government's intention to place a price on carbon emissions in Ontario. Given that the exact mechanisms and associated details are not yet available, Enbridge Gas Distribution Inc. ("Enbridge" or the "Company") has a limited ability to outline the full scope and detail of opportunities that carbon pricing may make available to its demand side management ("DSM") activities.

3. Below Enbridge outlines the opportunities that Enbridge may explore, depending on the direction taken by the MOECC.

Opportunities

4. At present, Enbridge does not claim ownership of carbon emission reductions realized by its customers through participation in its DSM programs.

5. The opportunities presented by carbon pricing will, in large part, hinge on whether or not the mechanisms chosen for Ontario create a market for carbon emission reductions which can be sold or traded. The following opportunities assume that there will be a market for carbon emission reductions which can be sold or traded.

[1] Ministry of the Environment and Climate Change (2015), "*Ontario's Climate Change: Discussion Paper 2015",* Government of Ontario, p. 38, para. 1.

6. In the residential sector, very few customers will have the knowledge, means, or time to take the steps necessary to extract the financial value of the carbon emission reductions they create through participation in DSM. As well, individually the value to a single residential DSM customer is likely very small and, as a practical matter, unsellable. As a result, Enbridge believes that it is appropriate to claim ownership of these emission reductions as it is in a position to act as an aggregator of the reductions attributable to residential DSM participation. In collecting small quantities of carbon emission reductions from a large number of program participants, Enbridge could achieve the critical mass of reductions necessary to attract buyers and create value.

7. One resulting possibility of Enbridge acting as the aggregator is that residential DSM customers could then use the economic value of their carbon emission reductions to increase the DSM incentives otherwise available to them under Enbridge's DSM programs. The Company would, in effect, be monetizing the value of the carbon emissions reductions that participating DSM residential customers generate.

8. In the commercial and industrial sectors, many customers may possess the knowledge, means and resources to monetize the financial value of the carbon emission reductions they create through participation in DSM. Given this, absent a request by a commercial or industrial customer, Enbridge does not believe it is appropriate for it to claim ownership of these emission reduction credits. Indeed, if Enbridge did claim ownership of such credits, it could act as a disincentive to participation by some commercial and industrial customers.

9. Enbridge is cognizant of the fact that some commercial and industrial customers do not, by virtue of their size and available resources or traits, possess the necessary knowledge, means and resources to extract value from the emissions

reductions that they generate. A further possibility therefore is for Enbridge to act as an aggregator on a voluntary basis for such commercial and industrial customers. This would allow the Company to similarly monetize the value of the carbon emissions reductions achieved by this segment of commercial and industrial DSM customers.

Revenue and Accounting Treatment

10. Given that the mechanisms governing carbon pricing in Ontario have yet to be announced, Enbridge does not have a detailed proposal regarding the above-noted opportunities at this time.

11. The Company expects that to the degree the above-noted opportunities generate revenues, they should be subject to a fair and reasonable sharing between ratepayers and shareholders. The approach should yield a net benefit to ratepayers while rewarding the shareholder for the innovation and effort expended by Enbridge. Costs incurred by the Company should be determined on a fully allocated basis and recovered from the revenues generated.

12. Enbridge expects that similar to the financial and implementation details of the opportunities that may arise, the details of the accounting treatment of expenses and revenues should be determined at a later date when the details of Ontario's carbon pricing model are known.

CDM COLLABORATION

1. Enbridge Gas Distribution Inc. ("Enbridge" or the "Company") has always worked with its partners in the marketplace, to promote and implement its energy efficiency programs. In particular, Enbridge has increasingly worked to build relationships with electric local distribution companies ("LDCs") to collaborate on customer centric energy solutions. Collaboration to date has taken many forms, including:

   - Co-promotion, whereby the Company and business partners promote one another's programs to their customers;
   - Joint delivery, whereby the Company uses the same delivery agent as its partners' corresponding programs;
   - Formal delivery on behalf of the other partner, as was the case for the High Performance New Construction ("HPNC") program; and
   - Collaboration initiatives through various third party organizations, such as the Race to Reduce initiative.

2. Enbridge has voluntarily worked to understand and has actively promoted the enabling of successfully integrated conservation programming to the benefit of customers. In 2008, Enbridge and Union Gas Limited ("Union") delivered the commercial new construction program known as HPNC. In that program, Enbridge contracted directly with the then Ontario Power Authority ("OPA") to generate electricity savings with the objective of meeting electricity savings targets. Enbridge, working with Union in each utility's respective territory, was successful in delivering 57.5 MWs of peak demand savings which represented 115% of the contracted goal. In 2011, after the release of the *Green Energy Act*, Enbridge entered into contracts with 23 LDCs and, together with Union, delivered the second generation of the HPNC program in these areas. While the program is now in the

wind down phase, it should be recognized that it resulted in over 22 MWs in peak energy savings within limited geographies.

3. Enbridge has also been an active participant in electric conservation through its membership in the Coalition of Large Distributors, Advisory Council on Conservation, Conservation First Advisory Working Group ("CFAWG") and the recently established Conservation First Implementation Committee ("CFIC"), and replaced CFAWG. In these groups and meetings, Enbridge has consistently supported collaboration by providing insight on the Company's programs, processes and framework parameters so that awareness of demand side management ("DSM") by the electric stakeholders continues to grow, and bridges between electric and gas conservation can be built.

4. Currently, the CFIC is in the process of assessing and renewing its Working Group structure. Working Groups are where LDCs work to design Province-Wide programs and related enabling elements. Enbridge was pleased to have recent confirmation that the gas utilities will be able to participate fully in these Working Groups.

5. Enbridge has been approached by a number of utilities and the Independent Electricity Systems Operator ("IESO"), regarding development and involvement in LDC pilot programming, Local Distributor Conservation and Demand Management ("CDM") programs, research (e.g., Potential Study) and stakeholder consultation. Currently, Enbridge is involved in a number of business case development discussions regarding collaborative Local Distributor CDM programs and pilots. In some cases the lead LDC has received approval of their program and in others it is pending, or has yet to be submitted to the IESO for approval. These programs and

pilots, in some cases, represent new markets or approaches for Enbridge, and in others, are technology demonstration projects where Enbridge already has experience. Either way, involvement in Local CDM programs and pilot projects that have a gas component is critical to building trust and collaboration between gas and electric utilities. It should be recognized that for a number of reasons, collaboration in all program areas in all sectors will take some time to achieve. While some programs will lend themselves more easily to collaboration depending on their development timeline (and whether the electric and gas timelines coincide), the extent of collaboration is dependent on the compatibility of administrative processes, technologies, and the degree to which customer delivery efficiencies can be achieved.

6. The following sections outline Enbridge's key areas of focus for collaboration during the Multi-Year DSM Plan.

Low Income Programming

7. As this area involves whole home programming and elements such as audits and education, which are as meaningful for gas as they are for electric utilities and, because delivery synergies are quite apparent, Low Income has been identified as a priority area for collaboration. Given the prevalence of low income properties in Toronto, Enbridge has been working closely with Toronto Hydro for several years to evolve collaboration in this area. There remains an opportunity to enhance this collaborative concept within Toronto and with other parties moving forward.

Residential Whole Home Retrofits

8. Opportunities for natural gas savings in the residential space primarily involve space and water heating. Given that the low hanging fruit has been picked in the

residential space (low flow showerheads and faucets are examples of where the market has been largely saturated), the remaining opportunities are “deep” in nature. What this means is that the opportunities are tied to comprehensive approaches to the home that in many cases are more expensive than measures implemented in past years. These measures include, but are not limited to, increasing insulation levels, more efficient windows, doors, furnaces and adaptive thermostats, as well as caulking and sealing. Typically residential customers do not understand nor do they have the time to navigate separately, the incentive programs and requirements offered by the various gas and electric utilities. As such, a single touch point of entry which would allow residential customers to address their home’s energy usage is ideal. Welland Hydro and PowerStream have both shown interest in working with Enbridge on a comprehensive whole home retrofit pilot initiative. Enbridge is actively moving forward with these utilities and hopes to make progress and achieve results within the next two years.

<u>Residential New Construction</u>

9. Enbridge has a successful in-flight offer that is well received by builders called “Savings by Design”. The offer involves design charrettes which are essentially roundtable, multi-disciplinary, interactive design/build sessions whereby builders and their contractors collaboratively learn to design their buildings to be more energy efficient. These integrated design processes are followed by a commitment to build buildings 25% more energy efficient than code. Enbridge has extended invitations to interested LDCs as well as the IESO for building design charrettes.

Witnesses: M. Lister
F. Oliver-Glasford
E. Reimer
R. Sigurdson

Small Commercial

10. The small commercial market has been traditionally underserved by Enbridge in programming given the limited application of prescriptive measures, the small savings opportunities relative to larger customers, and the significant cost barriers associated with these customers. For example, small commercial customers are often owner-operated. Investing in energy upgrades very often falls to the bottom of their priority list when compared to dealing with more immediate needs such as staffing and day-to-day profitability. As such, working together, in concert with appropriate LDC programs such as direct install lighting or other direct install measures, appears to be a sound course of action as, over time these partnerships should reduce fixed program costs. In this area, Enbridge has worked with and will continue to work with several LDCs in their Local Distributor CDM program to deliver to small commercial customers with a view to influencing the shape and design of a "Province-Wide" gas and electric program. Province-Wide programming is terminology used by the IESO and electric distributors, and identified on page 27 of the Board's EB-2014-0134, *Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020)* ("DSM Framework"):for programs that are offered across Ontario. Local Distributor CDM programming and Pilot Programs are also terms used by the IESO to represent those programs which are run by one LDC (or a group of LDCs should they be working together) to launch smaller scale, unique from Province-Wide programming, in a particular franchise area.

Industrial and Commercial and ("C/I") Custom Projects

11. Enbridge has been organically developing relationships with LDCs whereby sales teams are "connecting the dots" between one another. As such, where appropriate

and logistically possible, Enbridge and LDC partners have been coordinating customer visits and working collaboratively on customer energy solutions. This is occurring with increasing regularity with Enersource, Toronto Hydro and several others. Interest has also been expressed by several other LDCs as a natural course of coordinating activity for larger customers in the C/I space.

Other Initiatives

12. Enbridge will continue to meet regularly with LDCs in its franchise area along with the IESO to discuss new and collaborative ideas that show promise. When concepts and potential programs that have an electric component are considered at Enbridge, they will be communicated through the Working Group process and through informal discussions with LDC's with a view to recognizing opportunities to collaborate and achieve enhanced results. This may happen either by impacting the CDM Province-Wide program during a design cycle or suggesting a new Local Utility CDM or pilot program opportunity. Conversely, where a LDC approaches the Company with a concept or idea, Enbridge makes best efforts to actively participate in program design and deployment.

DSM/CDM Coordination and Integration Summary

13. Table 1 on the following page provides a brief outline of the collaboration discussions undertaken by Enbridge with various electric LDC's in its franchise area over the past 18 months. The discussions and efforts outlined below relate specifically to efforts to coordinate and/or integrate with LDC CDM activities as a course of the Company's regular delivery of DSM moving forward.

Witnesses: M. Lister
F. Oliver-Glasford
E. Reimer
R. Sigurdson

14. Specific LDC names are withheld so as not to jeopardize any ongoing discussions on their part, and because most are still in the process of having their plans approved by the IESO.

Witnesses: M. Lister
F. Oliver-Glasford
E. Reimer
R. Sigurdson

Table 1: DSM/CDM Coordination and Integration Summary

LDC	Topic	High Level Overview
LDC 4	Low Income	High level of desire to develop a joint Low Income program delivered by a third party within the franchise
	Sales Training	Small collaborative effort to include Enbridge in LDC 4 sales training session
LDC 5	Low Income	High Level Discussion around opportunity to collaborate on Low Income programming – details to be determined
LDC 6	Residential New Construction	LDC 6 is interested in EGD running a residential new construction program on their behalf.
	Low Income	LDC 6 interested in coordinating to jointly use the same contractor.
	Commercial/Industrial Audit Programs	LDC 6 is interested in having discussions around collaboration with Commercial/Industrial audit programs
	CHP	Interested to meet to create a "catalogue of CHP opportunities"
	Industrial and Commercial	Interest in sales collaboration meeting for relationship development so that leads and information can be more readily shared.
LDC 8	Cost Sharing for Regional Events	Interest in potentially sharing costs for customer meetings where gas and electric programs are presented.
LDC 9	Combined E/G Residential Energy Savings Kit	Discussions around coming up with an electric and gas residential home energy savings kit for joint marketing.
LDC 10	Joint Meetings	Collaborative joint conservation meetings have begun.

Witnesses: M. Lister
F. Oliver-Glasford
E. Reimer
R. Sigurdson

Other Collaboration Efforts	Topic	High Level Overview
Conservation First Implementation Committee	CDM Conservation First Implementation and Framework issue review/ resolution	Bi-weekly meetings for a small group of interested parties including LDCs, gas utilities, Ministry of Energy, IESO, EDA, OEA. Determining governance structure for program design sector based “working groups”.
Union Gas	Alignment opportunities	EGD looking for alignment opportunities with UG.
IESO (formerly OPA)	Provincial opportunities through working groups	High degree of desire to involve EGD and UG in planning.

Barriers to Larger Scale Collaboration

15. For many years Enbridge has had a strong track record of collaboration with various business partners in promoting electric and gas conservation. Much of the DSM / CDM collaborative success in recent years has been regionally based and is trending positively towards more interest and activity from a variety of potential regional LDC partners in a number of new and interesting areas. For example, on March 9th, 2015, Energy Minister Chiarelli in his keynote address at the Electricity Distributor’s Association Annual Meeting, lauded Niagara Power and Enbridge for their planned joint initiative in the motel/hotel sector. This has led to an environment that, while rewarding and rich in innovation and thought, is still subject to the attendant legal and administrative costs that arise given the volume and complexity of contracts with numerous partners.

Witnesses: M. Lister
F. Oliver-Glasford
E. Reimer
R. Sigurdson

16. There remains potential to achieve more cost-effective collaboration using a Province-Wide platform to maximize efficiencies and synergies for customers. Currently the sheer number and variety of electric offers in the market (sometimes within the same sector and regions) means that it will take time for the selection and identification of the programs or initiatives which are most likely to succeed and achieve acceptance on a broad scale. CDM offers that find their way to the development table as a potential province-wide program may not be picked up by all LDCs. This shortfall in obtaining strong synergies across the broader market is the largest single barrier to meaningful large scale collaborative results. As a result, Enbridge recognizes that even with best intentions, resources to collaborate may be front loaded in the early years of the Company's Multi-Year DSM Plan, with the hope that efficiencies will evolve in the latter half of the plan.

17. Additional barriers to larger scale collaboration include:

(a) Differences in budgets and internal expectations;

(b) Collaboration funding currently does not include electric and gas collaborative efforts;

(c) The electric regulatory framework and the maturity of the CDM plans of LDC's does not always coincide with Enbridge's timelines;

(d) The difficulty in identifying the areas where multiple LDC partners and Enbridge are equally motivated to focus resources;

(e) Customer data sharing difficulties due to regulatory and privacy issues;

(f) Concerns and complexities that can arise with two entities involved such as the generation of joint RFP's and joint partner retainer agreements; and

(g) The differing methods and standard used for the evaluation and verification of results.

Conclusion

18. Collaboration will continue to expand throughout the course of the DSM Framework period. It will be aided significantly as the electric utilities continue to evolve their conservation skills and portfolios, and as Enbridge better understands and learns to navigate CDM administrative and planning processes. It will also be aided by the flexibility provided by the Conservation and Innovation Fund discussed in Exhibit B, Tab 4, Schedule 2.

Witnesses: M. Lister
F. Oliver-Glasford
E. Reimer
R. Sigurdson

COLLABORATION AND INNOVATION FUND

1. In the past because of the lack of encouragement, innovation through pilots was minimal. Moving forward, the Ontario Energy Board (the "Board") has signaled its interest in the utilities driving forward collaboration and innovation in particular in guiding principle #3 and guiding principle #5.[1] The Board further includes as a key priority, the "development of new and innovative programs, including flexibility to allow for on-bill financing options".[2]

2. Enbridge Gas Distribution Inc. ("Enbridge" or the "Company") sees a clear need to have some available budget to collaborate on the pilot projects in the marketplace. Enbridge has been in numerous dialogues with local electric distribution companies ("LDCs") broadly and with specific LDCs on their program design and deployment processes. These processes include the requirement that all new Conservation and Demand Management ("CDM") programs be tested through a pilot before being considered for a "Province Wide" program. In turn, many of the electric utilities with ideas regarding programs for their customers are proposing business cases for pilots which in many cases include the requirement for a contribution of time and dollars from Enbridge. Table 1 on page 3 of this exhibit lists examples of the Company's discussions with LDCs to date regarding pilot project requests. Some pilot projects that have been shared with Enbridge are indeed still in development or in the approval stages at the Independent Electricity System Operator ("IESO") and are therefore not ready to provide details on in this filing.

[1] EB-2014-0134, *Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020*m December 22, 2014, p. 8
[2] Ibid. pg 26

3. Providing the Company flexibility to commit to pilot funding requests, in addition to driving new pilots out into the market itself, will be advantageous in building tangible examples upon which to further collaboration practices. Said another way, the marketplace, gas utilities, and LDCs will benefit from more concrete examples of collaborative programs to begin to establish best practices.

4. As such, Enbridge has proposed a Collaboration and Innovation Fund (“CIF”) for each year of its Multi-Year DSM Plan to facilitate a relatively small, but meaningful commitment to the ongoing development of appropriate innovative and collaborative pilots and research.

Collaboration Pilot Summary

5. The following table provides a brief outline of the collaboration efforts undertaken by Enbridge with various electric LDC’s in its franchise area over the past 18 months. The discussions and efforts summarized in the table relate specifically to LDC and Enbridge pilots that would require funding through the CIF.

6. Specific LDC names are withheld so as not to jeopardize any ongoing discussions on their part, and because most are still in the process of having their plans approved by the IESO.

Table 1: Collaboration Pilot Summary

LDC	Topic	High Level Overview
LDC 1	Low Income Pilot	Pilot with a sole delivery agent, to deliver both Enbridge and LDC 3's low income programs to 300 units within Toronto Community Housing umbrella, with a desire to further refine and blend the approach to one Low Income program to a broader audience after the pilot.
	Commercial Office Pilot	LDC 3 pilot to provide energy use reports to large office building customers (targeting 20) with recommendations on operational and capital measures to reduce electricity use. Interest in including a gas component.
LDC 2	Commercial Direct Install Pilot	General high level discussion - potential established for including gas measures into the direct install pilot LDC 7 is proposing.
LDC 3	Community Energy Retrofit Pilot	High degree of desire to have EGD join the LDC pilot to deliver a whole home (gas/electric) program.
LDC 4	Commercial Hotel / Motel Retrofit Pilot	Pilot for joint delivery of prescriptive and Direct Install measures to hotel / motel sector.

ON-BILL FINANCING

Background

1. The issue of an on-bill financing ("OBF") option was raised during discussions between Enbridge Gas Distribution Inc. ("Enbridge" or the "Company") and Intervenors, prior to filing Enbridge's 2012 to 2014 Multi-Year DSM Plan (EB-2011-0295). While a consensus on an OBF proposal was not reached due to the varied views and opinions on the matter at that time, the Company agreed that it would consider the matter further in the future.

2. Late in 2012, then Minister of Municipal Affairs and Housing, Kathleen Wynne, approved changes to the *Municipal Act* and the *City of Toronto Act* that empowered all municipalities in Ontario to take the lead on energy and water conservation programs. Specifically, municipalities, such as Toronto, were given the ability to use a financing tool called a "local improvement charge" ("LIC") to help property owner's finance changes to their homes that are aimed at reducing energy or water consumption.

3. This development acted as a catalyst for the issue and in late 2012, Enbridge and intervenors met to further discuss the options available for OBF. These discussions made it clear that many of the conflicting views of parties as to the appropriateness of Enbridge implementing an OBF remained, with some parties advocating for Enbridge to implement an OBF solution as soon as possible, and others suggesting there was a conflict of interest and insufficient market interest to warrant Enbridge's involvement. As a result, it was decided that the best course of action was to explore opportunities for incorporating the newly changed *Municipal Act* – LIC solution within suitable DSM program offerings.

4. Enbridge commenced discussions with key supporters of the LIC charge, specifically the Toronto Atmospheric Fund (“TAF”), Collaboration on Home Energy Efficiency Retrofits in Ontario (“CHEERIO”), and the City of Toronto. By the end of 2013, Enbridge and the City of Toronto had created a symbiotic initiative that encouraged Toronto residents who were contemplating energy efficiency upgrades to take advantage of Enbridge’s Community Energy Retrofit (“CER”) offer. This initiative further endorsed deeper retrofits with the assistance of Toronto’s newly piloted Home Energy Loan Program (“HELP”).

5. Results of the HELP program show a slow gathering of momentum when compared to the number of overall participants in the CER program. The HELP program saw 212 applications for funding with 118 actually approved in its first full year of service in 2014. The key barrier being mortgage lenders have been resistant to providing approval for applicants to apply significant dollar amounts to their tax bill.

6. With regards to commercial properties, Enbridge continues to work with the Tower Renewal Office of the City of Toronto (the “City”) as it promotes its LIC program for multi-residential properties, the High-rise Retrofit Improvement Support Program (Hi-RIS). With Enbridge’s newest initiative for privately owned multi-residential buildings in targeted low income neighborhoods, Enbridge and the City are jointly promoting the programs as a turnkey energy efficiency solution for building owners.

7. In late 2014, Enbridge committed to co-funding a study aimed at establishing the viability of using LIC for commercial (excluding multi-residential), industrial and institutional buildings. Additionally, the Company is a joint proponent to an Natural

Resources Canada (“NRCan”) project proposal that will look into using LIC for new residential single family dwellings that would have certified energy efficiency upgrades, e.g. Energy Star or Enbridge’s Savings by Design program.

8. Social housing buildings are also accessing the Enbridge program and TAF’s Energy Savings Performance Agreement (“ESPA”). In 2014, one social housing provider financed its building retrofit project with Enbridge and TAF program support. Several Toronto Community Housing projects are underway that combine Enbridge’s program incentives and services using TAF’s ESPA.

Next Steps

9. Over the past 12 months, discussions have taken place in respect to a broader and more expansive OBF option. Enbridge presented discussion points to the Ministry of Energy in 2014 identifying an OBF proposal which, of necessity, would compete with others in the marketplace. On September 11, 2014, the Ministry of Energy held an OBF discussion where all attendees were asked to provide suggestions for an OBF proposal. On January 8, 2015, Enbridge met with two parties expressing interest in advancing financing for the purposes of OBF. These parties were TAF and Environmental Defense (“ED”). This meeting evolved into a program design roundtable where further details of a potential OBF proposal were discussed. Concepts and ideas raised at this meeting are the subject of follow-up steps, which are continuing.

10. Based upon its experience and discussions with stakeholders to date, Enbridge believes that a workable OBF proposal will require leveraging of exploratory activities (i.e., partnership with organizations currently financing energy-efficiency upgrades through LIC, revolving lines of credit, etc.) and / or a highly specialized

Witnesses: M. Lister
E. Lontoc
F. Oliver-Glasford
J. Paris

and focused program design. Enbridge believes that any OBF proposal should be informed by expected further communications issued by the Ministry of Energy, and subject to Ontario Energy Board Approval.

11. The Company remains committed to being responsive to the Province's Long-Term Energy Plan, and future direction, however, Enbridge believes any OBF activities must not affect the risk profile of the utility, and ensure the utility is kept whole in terms of cost recovery.

Budget Requirements

12. Enbridge estimates that it will require between $10,000 and $40,000 to proceed with research and design planning during the 2015 and 2016 timeframes.

13. Depending on research outcomes and / or opportunities that are identified, Enbridge forecasts that it will require implementation funds in 2016 and beyond. The amounts required for implementation, if appropriate, will be identified through future research and piloting opportunities.

Witnesses: M. Lister
E. Lontoc
F. Oliver-Glasford
J. Paris

GREEN BUTTON INITIATIVE

1. The Green Button Initiative will provide Enbridge Gas Distribution Inc. ("Enbridge") customers with access to their energy usage data in an easy-to-understand and data driven platform, providing consumers the ability to review their data, share their own energy use information and manage their consumption with application developers and solution providers. Green Button is available to close to 3 million gas and electric residential and small commercial customers in Ontario as a common data standard.

2. The Green Button initiative began in the U.S. with a White House call to action to provide energy consumers with an easy to use and secure application for downloading and viewing energy consumption. Consumers can simply click a button to receive detailed consumption use. The Green Button initiative has been encouraged in Ontario through the efforts of the Ministry of Energy and the MaRS Data Catalyst – an innovation and entrepreneurial hub focused on connecting people with data. The purpose was to create a working group and investigate the opportunities for laying the foundation for Green Button in Ontario.

3. The working group launched in 2012 and was comprised of representation from the Ministry of Energy, the Ontario Energy Board, the Ontario Power Authority, the Independent Electricity Systems Operator, the Information and Privacy Commissioner of Ontario, seven utilities (Guelph Hydro, Hydro One, Hydro Ottawa, London Hydro, Milton Hydro, Powerstream, Toronto Hydro), the Clean Energy Institute, and MaRS Discovery District (Data Catalyst and CleanTech

Practice). The group also worked with partners from the United States to ensure the compatibility of the Green Button Standard in Ontario.

4. The Green Button solution was initially created to address the needs associated with managing the increased amount of data received by smart meters. Enbridge currently does not have smart meters; for the vast majority of Enbridge customers, meters are read every other month. Although Green Button can still leverage bi-monthly data points, consumption details for the natural gas utilities will not be as comprehensive as what is provided by LDCs who have implemented smart meters.

5. The ‘Download My Data’ standard launched as a pilot with four utilities in the spring of 2013. As of 2015, over 60% of Ontario consumers have access to ‘Green Button – Download my Data’. Next steps include making ‘Green Button – Connect My Data’ available so that consumers may select the way in which their data is presented to them.

6. The Green Button solution allows customers to download their data in an XML format permitting the effectiveness of the user interface / experience. The ‘Connect My Data’ solution, which has yet to fully roll out across even piloting LDC’s, will be an imperative next step if the initiative is to successfully address its current goals across all customer types.

7. Green Button consists of 2 separate steps: ‘Green Button Download My Data’ and ‘Green Button Connect My Data’.

Green Button: Download My Data

- Provides electricity consumption data in a standardized and consistent format regardless of the utilities;
- Drives efficiencies in the industry by making energy reporting and benchmarking easier and more cost-effective;
- Improves data consistency and accuracy; and,
- Encourages greater participation in reporting and benchmarking initiatives by removing the data collection and processing barrier.

Green Button: Connect My Data.

- Allows solution providers a free and more efficient way to access client data, creating more dynamic and easy to use energy management services; and,
- Enables solution providers to offer innovative and interactive tools to better manage a building’s electricity consumption.

8. Enbridge commenced conversations with the Ministry of Energy for the purposes of creating a working group that will investigate the opportunity to incorporate natural gas consumption within the Green Button initiative. The other proposed members of this working group include Union Gas Limited, representatives from the Office of the Privacy Commission, and representation from participating members of the LDC Green Button pilot.

Witnesses: M. Lister
F. Oliver-Glasford
J. Paris

DSM INFORMATION TECHNOLOGY SYSTEM AND TOOLS

1. The information technology systems and tools utilized by the Enbridge DSM department serve two main purposes: i) to support strong relationship management functions; and ii) to facilitate the accuracy of documentation, tracking, reporting, and data verification functions. The two main applications are the Stakeholder Relationship Management ("SRM") system and the Data Analysis Reporting and Tacking System ("DARTS").

2. As a result of the 2015-2020 DSM Framework, it is fair to say that there are increasing expectations and fundamental changes in the types and variety of DSM programming that Enbridge will pursue in the future. This will necessarily result in material changes, both on the front end and back end of conservation delivery, and the Company's IT systems must keep up with such changes.

The Changing DSM Landscape

3. In 2015 the gas utilities are transitioning into the third DSM framework. Each successive framework has been more complex and demanding in terms of the expectations being placed on the Company to implement new and reformatted program offers in order to achieve all cost-effective DSM. The Company requires the functionality and flexibility within its IT systems in order to efficiently deliver innovative changes in programming and to expand and deepen market penetration.

4. It has been numerous years since decisions were last made about major upgrades and replacements to the DSM IT system. Since the implementation of Enbridge's current systems, the main applications and processes have been heavily customized to fit changing business needs. This is in part a reflection of the fact that Enbridge has ventured deeper into programming that reaches beyond resource

acquisition type offerings. This trend will continue over the next six years under Enbridge's proposed Multi-Year DSM Plan.

Limitations of Current Applications

5. In order to prepare for the 2015-2020 Multi-Year DSM Plan, the Company has undertaken a study to identify current and future DSM business requirements, including the limitations of existing applications. The study's scope included consideration of the potential to update and enhance existing applications, the time required to implement, and the cost of replacing existing systems. Once the implications of the 2015-2020 DSM Framework were understood by the Company, it was recognized that minor enhancements and further customization of the existing DSM applications would prove inadequate to support Enbridge's DSM requirements moving forward. There is, therefore, an important need to address the current IT systems used to support the DSM program.

6. The main limiting factors of Enbridge's current DSM applications are as follows:

- Inefficiencies due to the duplication of effort in terms of record maintenance as programs have expanded and moved into new areas. Since data related to individual projects is often held in multiple locations, there is at times a significant manual effort required to satisfy requirements around evaluation, measurement, verification, and tracking.

- Inability of the applications to enable the Company to utilize multiple delivery channels, which limits the reach of DSM programming to areas such as the small commercial, small industrial, and residential markets.

- Current technology utilized by DSM does not allow for advanced lead creation, information sharing, and campaign management. This leads to missed opportunities and limits the utility's ability to reach a wider customer base.

- System architecture does not provide the flexibility the business needs to change, modify, and adjust offer requirements and parameters. Modification of the application (such as creating additional tracking fields) requires customization that can be both costly and time consuming. This has traditionally limited Enbridge's ability to be nimble and broaden its scale when it comes to program development, tracking, and reporting for more complex offerings.

Future State Requirements

7. Priorities arising from the DSM Framework include social benchmarking, energy management, along with other market transformational and educational program expectations. Many of these programming areas require intricate, unique system solutions for reporting, evaluation, and quality control.

8. In addition to resolving current application limitations, a future state solution should also have the following functionalities:

   - It should be an integrated solution that connects various sources of information and provides the ability to automate data quality and integrity tests. This will not only enable the Company to better identify customer segmentation and market potential, but will also ensure the Evaluation, Measurement and Verification ("EM&V") process is simplified, efficient, and increasingly accurate. As the Board proposes to play a larger role in the EM&V process, Enbridge may be required to provide data and information on a prescribed basis. The efficiency and the accuracy of meeting these potential demands are highly dependent on technology.

- There should be sufficient system flexibility and potential synergies that will help promote DSM/CDM collaboration. Both the Independent Electricity System Operator ("IESO") and Union Gas Ltd. ("Union") are currently undertaking similar IT evaluation exercises in light of the new DSM Framework demands and expectations.

- It should be technology-ready" for the changing DSM landscape. The current technology doesn't provide the capacity to track, report, and complete the required analysis to support offers that involve behavioral modification and benchmarking. Much of this is performed outside the applications on an ad-hoc basis. This is not only costly, but also limits the Company's ability to 'mine' the data for effectiveness tests and future program development with increasing emphasis being placed on the areas of behavioral modification and benchmarking. The system must have the capacity to support such broad based initiatives. The system must also be capable of efficiently adjusting for updates to inputs and assumptions. As the DSM Framework indicates, it is important to invest in technology that enables these functionalities. Lack of a dynamic, DSM specific solution will limit Enbridge's ability to meet the priorities and objectives identified in the DSM Framework.

- The future IT system must be capable of adapting to and supporting new emerging programs such as Green Button and Pay for Performance. While these programs remain in the early stage of research and development, the Company's ability to participate and lead in respect of such programs would be severely challenged without the proposed replacement of its DSM IT systems. The current systems are incapable of handling many of the supporting requirements which such programs will require.

9. In summary, many of Enbridge's current IT applications are at end of life and will likely not be supported in future. The functionalities that will be required in future are, in many instances, not available with the current IT systems. Further heavy customization of existing systems is not recommended given the cost, likely complexity, and the limitations which are inherent with such an approach. The preferred option and the proposal which the Company is making in this Application is for the replacement of the current DSM IT systems.

10. It should be recognized that the DSM IT systems are operated on a stand-alone basis and provide support to different needs than the IT systems which support the Company's gas distribution, storage, and other utility functions. The applications have different life cycles than those utilized for gas distribution purposes. The need for the replacement of the DSM IT systems is a need identified contemporaneously with the development and issuance of the DSM Framework.

<u>Cost Estimate</u>

11. A high level estimate of the cost to replace existing DSM IT systems is $5 million. At present, the Company is undertaking an exercise to more precisely determine the system requirements and will be preparing a plan for the replacement and integration of the new IT system. It is expected that the majority of the work and costs will be incurred in the 2015-2016 period. The Company hopes to be in a position to file later in this proceeding a system description and plan for integration which will ensure that the Company meets its short term needs while integrating the new system into its DSM operations.

12. Enbridge has proposed including in its DSM Budgets for each of years 2016 through 2020 a DSM IT charge back of $1 million per year. The Company proposes that this amount be embedded into rates but that the revenue

requirement impact of the capital spending on the new DSM IT system be tracked and recorded in a new DSM Variance Account, being the DSM Information Technology Capital Spending Variance Account (DSMITCSVA). The Company will record in this variance account depreciation, interest, taxes, and return on equity costs associated with the IT systems' replacement. The Company will bring forward the variance account for review by the Board at the time that the Company seeks approval for the clearance of its other DSM deferral and variance accounts. The Company will at that time request that the difference between the amount recorded and the amount embedded in rates be cleared through to rates as a credit or debit.

13. As the replacement of the IT systems is being undertaken to respond to the requirements and demands arising out of the DSM Framework and the Company's Multi-Year DSM Plan, it is proposed that the capital costs of the replacement IT system be fully recovered over the term of the Plan. This will ensure that the costs of the replacement IT system are borne by those customers that benefit from the new IT system. As the costs relate to the acquisition and integration of replacement software, recovery of costs over this timeframe is consistent with the depreciation rate for software.

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Natural Gas Energy Efficiency Potential Study

Final Report

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Executive Summary

This executive summary provides a high-level overview of the work performed and the findings of this study. More detailed discussions and results are included in the main body of the report.

ES.1 Introduction and Background

Enbridge Gas Distribution, Inc. (Enbridge) engaged Navigant Consulting, Inc. (Navigant) to prepare an energy efficiency resource assessment of its service territories in March 2014. The study objective was to assess the system-wide technical, economic and achievable potential for gas energy savings from energy efficiency over the 10-year forecast horizon from 2015 to 2024. This effort produced a baseline calibration of end use gas consumption to actual gas consumption by end use category within Enbridge's service territories. Additionally, Navigant characterized over 20 key parameters for each gas savings measure that was analyzed (e.g., baseline assumption, cost, savings, market saturation, etc.). These efforts provided input data to Navigant's Demand Side Management Simulator (DSMSim™) model, which calculated technical, economic, and achievable savings potential for each measure and then aggregated the results.

ES.2 Approach

This section describes the overall approach to the study, including the approach to base case calibration and forecast, measure identification and characterization, and estimating technical and economic potential.

ES.2.1 Base Year Calibration

Navigant's DSMSim model was calibrated against Enbridge 2013 natural gas sales. Calibration through this bottom-up process ensured that our estimates of end use natural gas intensity combined with input assumptions of customer counts rolled up to the total natural gas usage for a given customer segment. Such calibration provides a level of assurance that bottom-up savings estimates are consistent with the estimated breakdown of actual energy consumption in Enbridge's service territories. To facilitate this calibration, Enbridge provided Navigant with a data file listing the energy consumption of all of its customers.[1] The list provided rate class, Standard Industrial Classification (SIC) code and annual gas consumption for the prior five years. Navigant analyzed the data provided to estimate the number of customers and gas sales by geographic region and customer segment. These data were then provided to the DSMSim model as inputs.

ES.2.2 Base Case Forecast

Navigant developed projections of residential building stocks, commercial floor area and industrial gas sales for the entire study period. The potential for energy efficiency was then modelled based on the resulting stocks and the changing proportion of new and existing buildings. Navigant compared the

[1] The information provided did not reveal any customer-identifiable information.

forecast that we developed with the long term sales forecast developed by Enbridge to ensure that it matched reasonably with the utility's expectations.

The base case forecast started with the calibrated level of customers and sales for 2013. Projected growth rates for residential homes, commercial floor space and industrial activity were based on values used in the Ontario Ministry of Energy's *Long-Term Energy Plan* (2013). The forecast demand for natural gas was then adjusted based on the historic change in natural gas intensity, ongoing changes to codes and standards and other technology and societal changes. Accounting for the effect of forecast changes in natural gas intensity and other factors effectively includes likely effects of natural conservation in the forecast.

ES.2.3 Measure Identification and Characterization

The scope of the project focused on reviewing the energy efficiency potential associated with measures currently approved by the Ontario Energy Board for inclusion in Enbridge Demand Side Management (DSM) programs, as well as measures which had been characterized as part of a prior energy efficiency potential study carried out in 2008. The review process resulted in a list of 61 measures. In addition, Enbridge identified 25 measures that it believed could have meaningful potential over the coming decade. Enbridge staff characterized the costs, savings and applicability of these measures. Navigant conducted a high-level review of Enbridge's characterization of these measures, including inspection of Total Resource Cost (TRC) values, units consistency and overall savings of each measure relative to the end use category.

ES.2.4 Estimation of Potentials

For this resource assessment, Navigant employed its proprietary DSMSim potential model to estimate the technical, economic, and achievable potential for gas savings. DSMSim is a bottom-up technology diffusion and stock tracking model implemented using a System Dynamics[2] framework. The DSMSim model explicitly accounts for considerations impacting retrofit, replace-on-burnout and new construction measures. For each of the replacement types, technical, economic, and achievable potential was determined and is reported in aggregate by sector, customer segment and end use.

Technical potential is defined as the energy savings that can be achieved assuming that all installed measures can immediately be replaced with the efficient measure, wherever technically feasible, regardless of the cost, market acceptance, or whether a measure has failed (or "burned out") and is in need of being replaced. Economic potential is a subset of technical potential, using the same assumptions regarding immediate replacement as in technical potential, but limiting the calculation only to those measures that have passed the benefit-cost test chosen for measure screening, in this case the TRC test. Achievable potential is a subset of economic potential, but further considers the likely rate of energy efficiency acquisition, which is driven by a number of factors including the rate of equipment turnover (a function of measure lifetime), simulated incentive levels, budget constraints, consumer willingness to

[2] See Sterman, John D. *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Irwin McGraw-Hill. 2000 for detail on System Dynamics modelling. Also see http://en.wikipedia.org/wiki/System_dynamics for a high-level overview.

adopt efficient technologies, and the likely rate at which marketing activities can facilitate technology adoption.

All savings reported in this study are gross, rather than net, meaning that the effect of possible free ridership is not included in the reported savings, per Enbridge's guidance and for consistency with past studies. Gross savings, rather than net, are included in this report for a number of reasons. First, there was a desire that the results of this report be compatible with different net-to-gross (NTG) assumptions in the future, permitting separate calculation of net results as NTG assumptions are updated. Second, there was a desire to be able to easily compare the results of this study with the prior potential study conducted by Marbek, which also reported only gross savings. Third, NTG assumptions can change with different assumptions regarding the program design, which is a scope that is outside of this study. Enbridge plans to calculate net savings separately, post study completion.

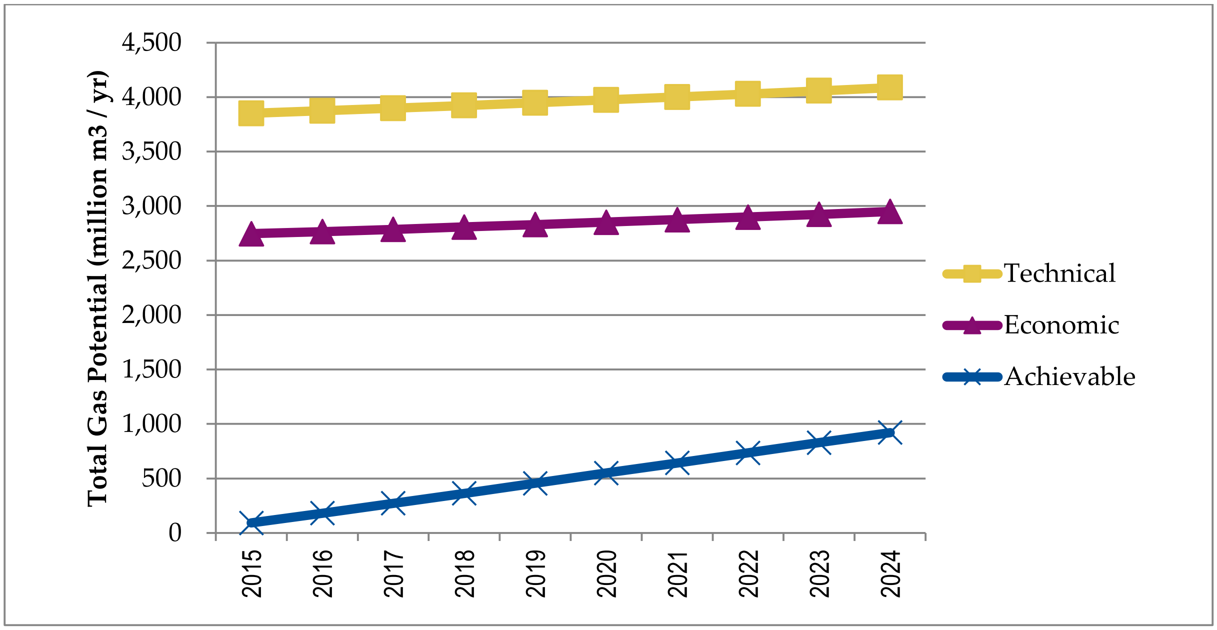
Navigant also conducted several sensitivity analyses as part of this study, including sensitivity on economic potential using the Societal Cost Test (SCT) instead of the TRC test, sensitivity on different assumed budget levels, sensitivity on different strategies to increase the cumulative cubic metres (CCM) acquired, and sensitivity on inclusion of avoided distribution costs.

ES.3 Findings

Using the DSMSim model, Navigant found that 4,087 million cubic metres (m^3) of natural gas total technical savings potential will be available in the Enbridge service territories by 2024, as shown in Figure ES-1 and Table ES-1. Roughly 72 percent of the gas savings technical potential was found to be economic, meaning that it met or exceeded a TRC ratio of 0.7 in the low income sector (consistent with Ontario Energy Board (OEB) DSM Guidelines) and 1.0 in all other sectors. Economic potential in 2024 is 2,950 million cubic metres. Technical and economic potential are relatively flat over the time horizon, with growth driven by increases in forecast building stock and gas consumption.

The achievable potential shown below (and in most figures throughout this report, except where budget sensitivity is conducted) is for the "base case" budget scenario, which corresponds to an average annual spending over the 10-year forecast horizon of $35 million (the average value if spending were to start at $32 million and increase with an assumed 2 percent/year inflation rate). Since achievable potential factors in the rate of energy efficiency acquisition (technical and economic potential do not), forecast achievable potential grows over the 10-year forecast horizon, reaching 920 million cubic metres of natural gas savings by 2024.

Figure ES-1. Gas Savings Cumulative Potential (million m³/year)



Source: Navigant analysis, 2014

Table ES-1. Gas Savings Cumulative Potential (million m³/year)

Year	Technical	Economic	Cumulative First-Year Achievable	Incremental Annual Achievable
2015	3,851	2,746	91	91
2016	3,874	2,766	181	90
2017	3,898	2,787	272	90
2018	3,922	2,808	363	91
2019	3,948	2,830	456	93
2020	3,974	2,852	549	93
2021	4,001	2,876	642	93
2022	4,029	2,900	735	93
2023	4,058	2,924	828	93
2024	4,087	2,950	920	93

Source: Navigant analysis, 2014

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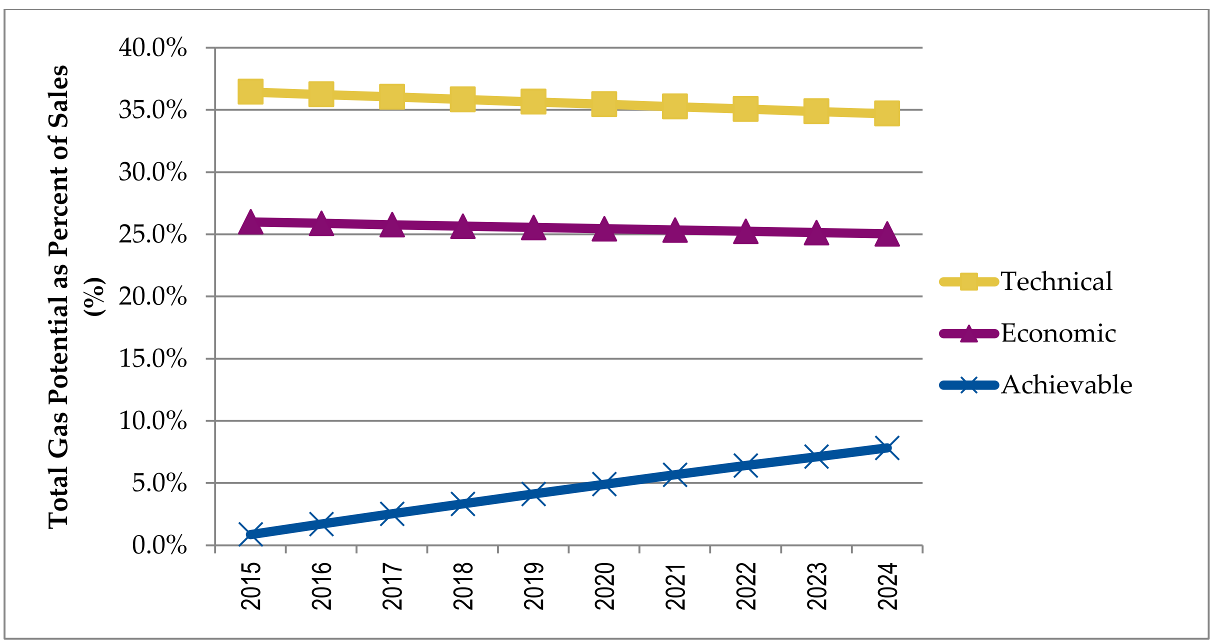
Figure ES-2 and Table ES-2 show technical, economic, and achievable potential as a percentage of forecast natural gas sales. At the end of the study period, technical and economic potential represent about 35 percent and 28 percent of forecast natural gas sales. The decrease in technical and economic gas potential *as a percentage of sales* shown in Figure ES-2 is caused by the changing mix of existing building stock and new building stock in the commercial sector. Over the ten-year horizon, existing building stock diminishes due to demolition, and new stock is added to account for growth in total building stock and replacements of demolished stock. Since measures that are applicable to existing stock (e.g., early replacement and replace-on-burnout measures) generally have higher savings per unit than measures that are applicable to new stock, savings potential grows over time in absolute terms but not as a percentage of forecasted sales.

Achievable potential, which accounts for the rate of energy efficiency acquisition, grows to 7.8 percent of forecast gas sales in 2024, or 0.78 percent/year on average over the 10-year study horizon, under the "base case" achievable potential scenario. This degree of achievable potential is consistent with Navigant's observations of savings levels in other jurisdictions it has studied, providing a degree of confidence that the results are reasonable. As is shown later in the report, higher savings are ultimately achievable with higher budget assumptions.

Figure ES-2. Gas Savings Cumulative Potential as a Percentage of Gas Sales



Source: Navigant analysis, 2014

Table ES-2. Gas Savings Total Potential as a Percentage of Gas Sales

Year	Technical	Economic	Cumulative First-Year Achievable	Incremental Annual Achievable
2015	36.5%	26.0%	0.9%	0.9%
2016	36.2%	25.9%	1.7%	0.8%
2017	36.0%	25.8%	2.5%	0.8%
2018	35.8%	25.7%	3.3%	0.8%
2019	35.6%	25.5%	4.1%	0.8%
2020	35.4%	25.4%	4.9%	0.8%
2021	35.3%	25.3%	5.7%	0.8%
2022	35.1%	25.2%	6.4%	0.8%
2023	34.9%	25.1%	7.1%	0.8%
2024	34.7%	25.0%	7.8%	0.8%

Source: Navigant analysis, 2014

In addition to modelling the base case scenario, Navigant also modelled achievable potential and costs for eight other budget scenarios. Increasing adoption of efficient technologies can be accomplished in a number of different ways. Often, potential studies simply increase the assumed level of incentives in conducting these sensitivity analyses. While this is certainly one way of increasing adoption, it is not the only way, and relying solely on increased incentives will tend to result in costly increases in achieved potential. Since Navigant's technology diffusion model includes other parameters beyond simple economics (e.g., marketing effectiveness), it has the ability to simulate increases in program participation from more aggressive program marketing as well. In this sensitivity analysis, Navigant increased both the assumed "marketing effectiveness" parameter of the diffusion logic in conjunction with an increase in incentives to provide a more realistic representation of the likely cost required to achieve increased savings.[3] Results of this sensitivity analysis are provided in Table ES-3, which shows the estimated 10-year budget compared with estimated 10-year cumulative gas savings potential.

[3] More specifically, Navigant first increased the estimated marketing effectiveness parameter by 100%, up to a maximum of 0.06, a value deemed to be on the high end of the realistic values for this parameter (the 75th percentile of this parameter is 0.055 across many technologies -- See Mahajan, V., Muller, E., and Wind, Y. (2000). New Product Diffusion Models. Springer. Chapter 12). At the same time, Navigant increased the "threshold incentive value" for each sector by a multiplicative factor (up to 2X the base case value) until the output budgets spanned the desired range.

Table ES-3. Cumulative Budget[4] and Achievable Potential by Portfolio Budget Scenario in 2024

Scenario	Budget ($ million)	Savings (million m3/yr)	% of 2024 Gas Sales	Avg. TRC Ratio (2015-2024)	TRC Net Benefits (billion 2015$)
A	312	882	7.5%	3.7	7.46
Base Case	350	920	7.8%	3.6	7.72
C	385	954	8.1%	3.6	7.94
D	424	987	8.4%	3.5	8.15
E	465	1,021	8.7%	3.5	8.36
F	510	1,055	9.0%	3.4	8.57
G	562	1,089	9.2%	3.4	8.76
H	618	1,123	9.5%	3.3	8.95
I	676	1,156	9.8%	3.3	9.15
J	827	1,197	10.2%	3.2	9.37
K	1,241	1,305	11.1%	3.0	9.96
L	1,700	1,414	12.0%	2.8	10.46

Source: Navigant analysis, 2014

ES.4 Caveats and Limitations

There are several caveats and limitations associated with the results of this study, which are outlined in more detail in Section 1.3 of the report.

[4] The base case budget corresponds with an average budget level over ten years ($35 million) equal to that if a starting budget of $32 million were increased at 2%/year inflation for 10 years (per the RFP). However, the actual budget simulated is not constrained precisely by the 2%/year increase, since budgets are an output of the model, not an input.

1 Introduction

This section provides an overview of the study, including background and study goals, a discussion of the report's organization and key caveats and limitations of the study.

1.1 *Background and Study Goals*

Enbridge Gas Distribution, Inc. (Enbridge) engaged Navigant Consulting, Inc. (Navigant) to prepare an energy efficiency resource assessment of its service territories in March 2014. The study objective was to assess the system-wide technical, economic, and achievable potential for gas energy savings from energy efficiency over the 10-year forecast horizon from 2015 to 2024. This effort produced a baseline calibration of end use gas consumption to actual gas consumption by end use category within Enbridge's service territories. Additionally, Navigant characterized over 20 key parameters for each gas savings measure that was analyzed (e.g., baseline assumption, cost, savings, market saturation, etc.). These efforts provided input data to Navigant's Demand Side Management Simulator (DSMSim) model, which calculated technical, economic, and achievable savings potential for each measure and then aggregated the results at the customer segment, sector, end use category and service territory levels.

1.2 *Organization of Report*

This report is organized as follows:

» Section 2 describes the approach to base year calibration and base case forecast of consumption, including a discussion of measure identification and characterization.
» Section 3 offers the approach and results of the potential study analysis for technical potential of energy efficiency measures, including a summary of results by end use category and customer segment.
» Section 4 offers the approach and results of the potential study analysis for economic potential, including a discussion of economic potential sensitivity analyses.
» Section 5 discusses the approach and results of the potential study for achievable potential, including sensitivity analyses on achievable potential under different budget and other assumptions.

1.3 *Caveats and Limitations*

There are several caveats and limitations associated with the results of this study, as detailed below.

1.3.1 Forecasting Limitations

Efficiency potential studies must make assumptions about the adoption of technologies that inevitably come with a degree of uncertainty. While techniques such as use of payback acceptance curves and technology diffusion models are considered to provide reasonable aggregate estimates of savings potential, such techniques (which must be applied to dozens or in some cases hundreds of technologies) are limited in their ability to accurately predict adoption for specific measures or in specific customer segments. Model calibration steps (e.g., comparing forecast results with achieved results) seek to ground the forecasts in the real world, but inaccuracies are bound to exist the further one drills into any particular technology or segment, even if the aggregate results are considered to be reasonable. One reason that aggregate results can in many cases be more reliable than individual technology or segment results is that forecasting inaccuracies, at the measure-level will exhibit a pooling effect when aggregated up to the portfolio (whereby positive or negative differences at a finer level of aggregation can help to offset each other in an aggregate result). While more in-depth technology adoption techniques do exist (e.g., discrete choice analysis) to improve the forecast accuracy for any given technology, application of these techniques to the quantity of measures analyzed in studies such as this are not typically warranted considering the dramatic increase in costs one would have to incur to calibrate a different adoption model for every single measure.

1.3.2 Program Design

The results of this study provide a big picture view of the likely potential for savings in the Enbridge service territory. However, this study is not considered to be a detailed program design. Different program designs and delivery mechanisms would inevitably result in different levels of adoption of efficient technologies, which also means that the output of this study is by no means a prediction of what will occur, but rather an estimate of what could be achieved under the specific set of assumptions outlined in this study. Program design is typically a separate activity and is outside the scope of this study.

1.3.3 Measure Characterization

Efficiency potential studies sometimes employ primary data collection techniques (e.g., customer surveys, on-site equipment saturation studies, etc.), which can enhance the accuracy of the results, though at greater cost and with longer schedules. The scope and schedule of this study, however, necessitated reliance on pre-existing secondary data sources (e.g., the OEB-approved measure list) for estimates of measure savings, costs and market presence (e.g., saturations and densities). The best available data were used in this study, with data specific to Enbridge's service territory used wherever possible. Details of secondary data sources relied upon are provided in Section 2. Additionally, 25 of the measures in this study were characterized directly by Enbridge staff, who estimated savings, costs and market presence using data from past program achievements. Navigant conducted a high-level review of these inputs.

Furthermore, we note that while we consider the measure list used in this study to appropriately focus on those technologies likely to have a material impact on savings potential over the study horizon, there is always the possibility that emerging technologies may arise that could increase savings opportunities over the forecast horizon. However, detailed investigation of possible emerging technologies was outside the scope of this study.

1.3.4 Measure Interactions

Energy efficiency measures in this study are modelled independently. As a result, the total energy efficiency potential may be different from actual potential, depending on the extent to which multiple measures are implemented by the same customer. Interaction effects most commonly occur when multiple measures are implemented affecting the same end use; however, they may also occur between end uses. An example of the first type of interaction (within an end use) would occur if a customer implements a program to review and maintain steam traps and also installs a more efficient boiler. To the extent that the steam trap program reduces heating requirements at the boiler, the savings from installing a more efficient boiler would be reduced. Interactions between end uses would be expected to occur if a homeowner purchased a top-loading washing machine or low-flow showerhead and also installed a more efficient water heater. The reduction in water heating demand would result in lower savings from the new water heater. Interactions may both decrease and increase savings depending on circumstances. For instance, if a homeowner installed a tankless water heater and also installed a more efficient furnace, the reduction in internal heat gain from eliminating the water heater tank would be provided more efficiently by the new, more efficient furnace.

Navigant has accounted for interactive effects by employing the following methods:

» Where measures clearly compete for the same retrofit application, we have created competition groups to ensure we do not double-count potential savings;

» For measures where we recognized that there could be significant interactions (e.g., industrial process/boilers), we adjusted applicability percentages to reflect some degree of interaction between measures.

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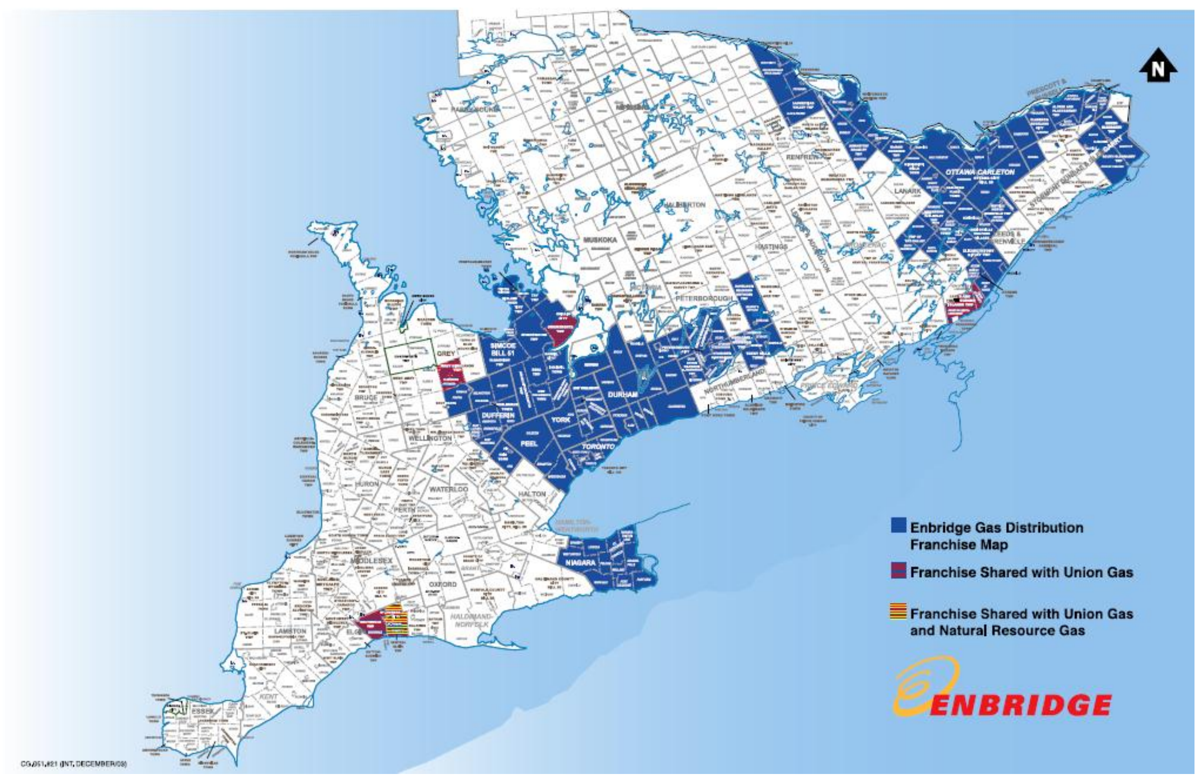
2 Base Case Forecast and Measure/Technology Profile Update

The following section describes the approach taken by Navigant in developing a base case forecast of natural gas sales over the study period, including the segmentation of sales by region, housing, income and economic activity, as well as the approach to characterizing the energy efficiency measures used in the analysis. The discussion provides a description of the information available regarding natural gas use for each sector and how this information was used in characterizing both the measures and the markets in order to estimate the potential for improved energy efficiency.

2.1 Base Case Forecast & Measure/Technology Profile Update

Enbridge Gas Distribution serves three different, non-contiguous regions of Ontario as shown in Figure 2-1. For the purposes of this study, the Enbridge service territory has been divided into two regions: the Greater Toronto Area (GTA) and Ottawa and surrounding area (Ottawa). The GTA region is defined as including all of the area from Toronto north to Georgian Bay, as well as the service area in the Niagara peninsula.

Figure 2-1: Map of Enbridge Service Territory



Source: Enbridge

To estimate the energy efficiency potential within Enbridge's distribution territory, Navigant divided Enbridge customers into "segments" with similar patterns of energy use and efficiency opportunities. In each sector (residential, low income, commercial, and industrial) new construction savings opportunities were modelled as a function of forecast new building stock and gas sales in each segment.

Table 2-1 shows the segmentation used for the study:

» Navigant divided residential customers into seven segments. Customers were first divided into categories based on the type of structure (detached, townhouse and semi-detached, and apartments). These segments were further sub-divided to allow independent characterization of the opportunity for savings in low income homes.

» Navigant broke the commercial sector into 14 segments, with the office and retail segments further broken into small and large facilities. The threshold between the small and large segments was set at 75,000 m^3 per year for the commercial segments.

» Navigant assigned industrial customers to 12 segments. The segments were selected to group industries with similar processes and patterns of energy use; however, we note that there is generally greater diversity in how natural gas is used within these segments than is the case in the other sectors. Navigant divided "other manufacturing" into two categories: large customers using over half a million m^3 per year and smaller facilities using less than that amount. Since Enbridge does not provide DSM programs to the power generation segment, sales to this segment were not included in the assessment of energy efficiency potential.

Table 2-1. Customer Segments by Sector

Residential	Commercial	Industrial
Detached	Multi-Residential	Asphalt
Townhomes & Semi-detached[1]	Office – Large[3]	Cement
Multi-Residential Low Rise[2]	Office – Small[3]	Primary Metals
Low Income Detached	Schools	Chemicals / Pharmaceutical
Low Income Town/Semi	Colleges & Universities	Food & Beverage
Low Income Multi-Residential	Logistics & Warehouses	Pulp & Paper
New Construction	Hospitals	Petroleum Refining
	Long Term Care	Green House / Agriculture
	Accommodation	Other Manufacturing – Small[4]
	Food Service	Other Manufacturing- Large[4]
	Retail – Large[3]	Other (including mining, construction, etc.)
	Retail – Small[3]	
	New Construction	
	Other	

Notes:
1. Attached homes other than apartments.
2. Apartments in buildings less than five storeys.
3. For the Commercial sector: Large = customer using >75,000 m^3/year; Small <= 75k m^3/year
4. For the industrial sector: Small = accounts using <0.5 million m^3/year. Large >=0.5 million m^3/year.

Source: Navigant

2.1.1 Base Year Calibration

To estimate the potential for energy efficiency, Navigant first developed an estimate of natural gas sales over the study period. Enbridge records sales data within its systems for each customer but has limited information on the characteristics of each customer or how the natural gas purchased is used "behind the meter." To develop an estimate of energy efficiency potential, Navigant combined sales data that Enbridge provided with publicly available information[5] on energy use to develop an estimate of natural gas use by sector and segment and a projection of how current levels of sales will change over the study period.

Enbridge provided Navigant with a data file of gas consumption for all of its customers. The information provided did not reveal any customer identifiable information. The file provided rate class, Standard Industrial Classification (SIC) code and annual gas consumption for the prior five years.

[5] Publicly available information sources included information from Statistics Canada and the Office of Energy Efficiency at Natural Resources Canada.

Navigant analyzed the data to develop a summary of the number of customers and sales by geographic region and segment. Customers and sales data were first summarized by rate code (Apartment, Residential, Commercial and industrial) and then by segment, within each region (GTA or Ottawa). Residential and apartment customers and sales were later segmented into residential and residential low income and by structure type, as shown in Table 2-2. The proportion of low income households in each region was estimated based on the prevalence of low income reported by Statistics Canada for the Census Metropolitan Areas (CMAs) served by Enbridge.[6]

For the commercial and industrial segments, SIC codes assigned at the account level were mapped to sector and segments. Navigant created an SIC map, which listed all SIC codes in the data and assigned each to a segment. For example, an account with an account code of "IND" and an SIC code of 2043 ("Manufacturing – Cereal Breakfast Foods") was mapped to the segment "food and beverage" within the "industrial" sector. The SIC map used in assigning accounts by sector and segment for the analysis is shown in Appendix D.

Once Navigant had mapped the data to the appropriate customer segment, Navigant calculated summary statistics for the total number of customers and gas sales by segment for each service territory. Analysis of the customer data that Enbridge provided found that a portion of accounts either did not have an SIC code assigned to the account or an SIC code for non-classified establishments (SIC >9990) had been used. These accounts represent roughly 44 percent of commercial and 20 percent of industrial gas sales. Savings for these accounts are reflected in the estimate of the overall efficiency potential by allocating these customers and sales to the defined segments within each sector based on the weighted share of sales represented by each segment.

Navigant provided the gas sales summary resulting from this analysis to Enbridge to review for reasonableness and made some adjustments based on further Enbridge investigation to identify the type of business associated with accounts. The resulting allocation of gas sales by segment is shown in Table 2-2. The distribution of sales by segment for each sector is shown in Figure 2-2 through Figure 2-4.

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[6] Prevalence of low income in 2010 based on after-tax low-income measure (%) from the National Household Survey. The proportion of low income households was estimated based on information reported by Statistics Canada. Navigant obtained the prevalence of low income households in each of the CMAs served by Enbridge and calculated the weighted average percentage of low income households for each of the two regions modelled. This share of low income households was applied to the number of residential households in order to estimate the number of low income households in each of the modelled regions.

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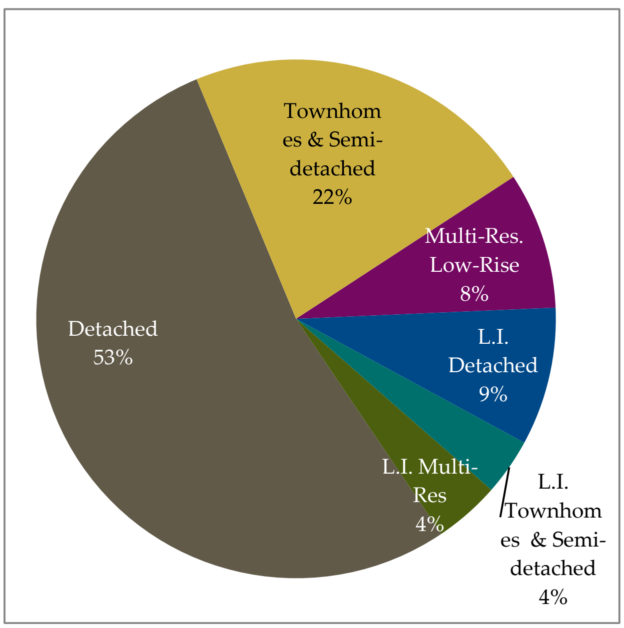
Table 2-2: Gas Sales by Customer Segment

Natural Gas Sales (1,000 m3)			
	Central Region/GTA	Eastern Region /Ottawa	Enbridge Total
Residential			
Detached	1,793,748	263,779	2,057,528
Townhomes & Semi-detached	697,569	154,918	852,487
Multi-Residential Low Rise	294,562	35,175	329,737
Residential Sub - Total -	2,785,879	453,872	3,239,752
Residential Low Income			
Detached	297,599	35,630	333,228
Townhomes & Semi-detached	115,733	20,925	136,658
Multi-Residential	146,611	11,878	158,489
Low Income Sub - Total -	559,943	68,433	628,375
Commercial			
Multi-Residential	722,989	118,848	841,837
Office - Large	471,161	98,808	569,969
Office - Small	455,636	62,304	517,940
Schools	167,606	36,773	204,378
Colleges & Universities	67,225	25,656	92,881
Logistics & Warehouses	303,403	21,561	324,964
Hospitals	83,583	24,776	108,358
Long Term Care	49,681	11,494	61,175
Accommodation	77,603	13,673	91,276
Food Service	150,472	27,236	177,708
Retail - Large	136,620	28,890	165,510
Retail - Small	254,325	54,420	308,745
Com - Other	1,114,822	133,398	1,248,220
Commercial Sub - Total -	4,055,126	657,836	4,712,962
Industrial			
Asphalt	30,029	602	30,632
Cement	156,511	5,329	161,840

Natural Gas Sales (1,000 m3)			
	Central Region/GTA	Eastern Region /Ottawa	Enbridge Total
Primary Metals	143,256	34,884	178,140
Chemicals / Pharmaceutical	421,840	16,133	437,974
Food & Beverage	215,328	3,638	218,966
Pulp & Paper	209,370	10,586	219,956
Petroleum Refining	13,613	52	13,665
Greenhouse / Agriculture	53,393	5,731	59,124
Other Manufacturing - Large	242,988	9,293	252,281
Other Manufacturing - Small	257,456	15,978	273,434
Other	7,775	1,146	8,921
Industrial Sub-Total -	1,751,560	103,372	1,854,932
Grand Total -	9,152,508	1,283,513	10,436,021

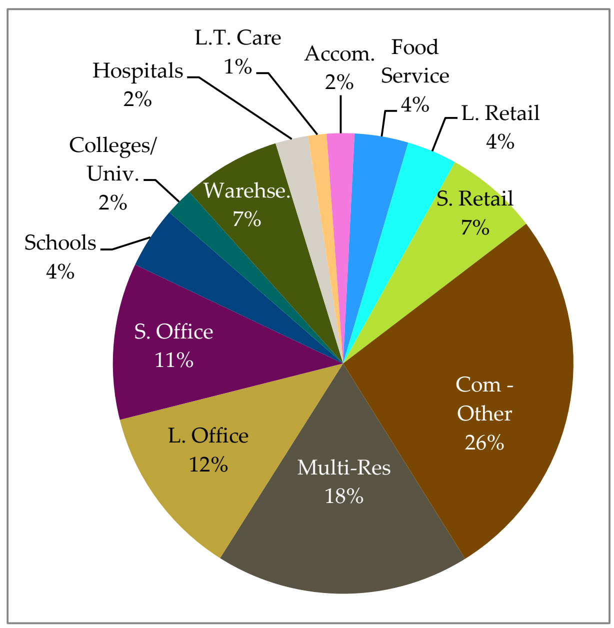
Source: Enbridge data analyzed by Navigant

Figure 2-2: Residential & Low Income Sales



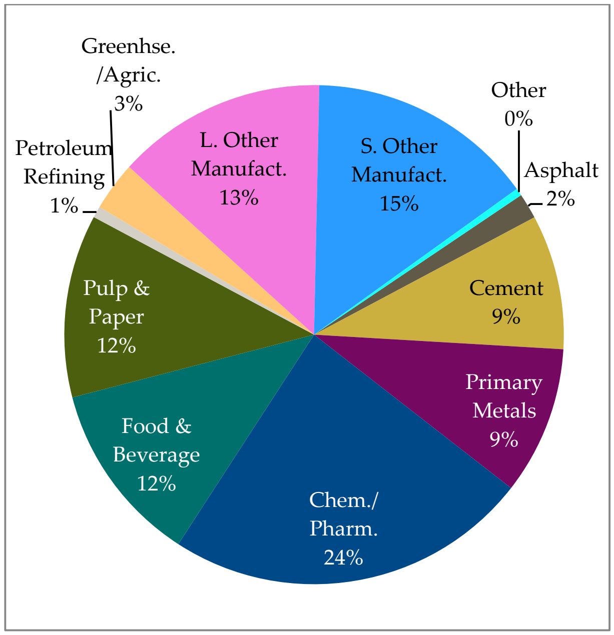
Source: Enbridge data analyzed by Navigant

Figure 2-3: Commercial Sales



Source: Enbridge data analyzed by Navigant

Figure 2-4: Industrial Sales



Source: Enbridge data analyzed by Navigant

2.1.2 Base Case Forecast

To estimate the potential for energy efficiency over the next decade, Navigant developed projections of residential building stocks, commercial floor area and industrial gas sales for the study period. The potential for energy efficiency was then modelled based on the resulting stocks and the changing proportion of new and existing buildings. Navigant compared the forecast developed with the long term sales forecast that Enbridge developed to ensure that it matched reasonably well with the utilities' expectations.

Enbridge forecasts natural gas use for planning purposes with an econometric model, using projected economic growth and other drivers to project future natural gas use. Navigant's base case forecast started with the calibrated level of customers and sales for 2013. Projected growth rates for residential homes, commercial floor space and industrial activity, shown in Table 2-3, were based on values used in the Ontario Power Authority's *Ontario Electricity Demand 2012 Annual Long Term Outlook* used in the Ontario *Long-Term Energy Plan* (2013).

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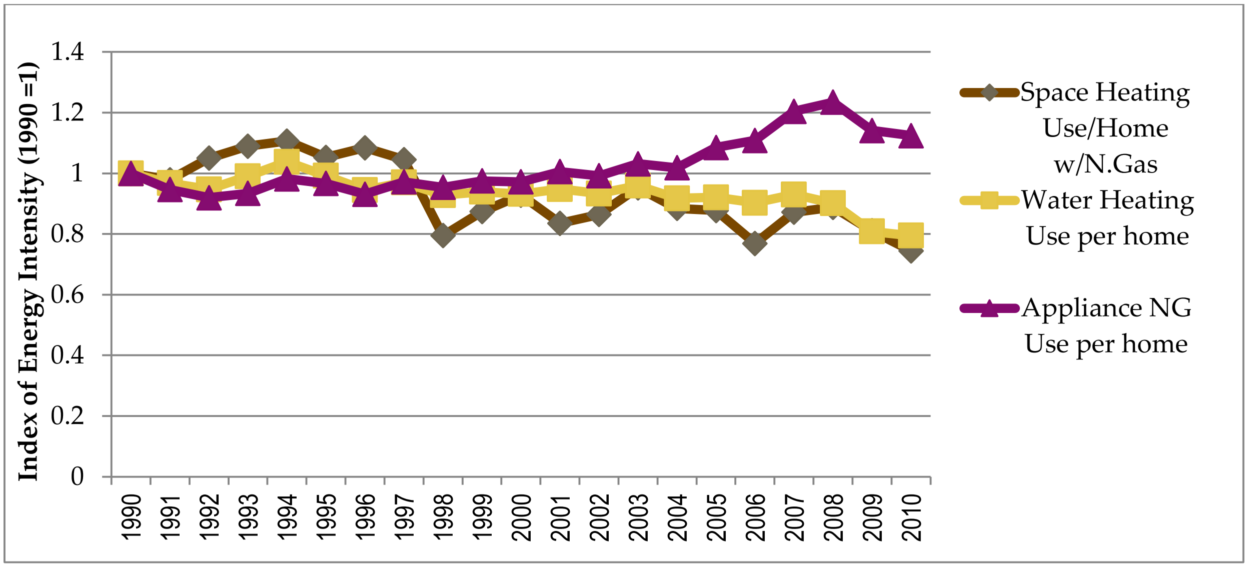
Table 2-3. Growth Rates Assumed in Forecast

Sector	Segment	Driver	Change (%/year)
Residential	Detached	Households	1.30%
	Attached	Households	1.40%
	Apartments < 5 Stories	Households	1.40%
	Apartments > 4 Stories	Households	1.40%
Commercial	Office	Floor area (m^2)	1.10%
	Non-Food Retail	Floor area (m^2)	2.70%
	Warehouse Wholesale	Floor area (m^2)	1.40%
	Other Commercial Buildings	Floor area (m^2)	3.10%
	Schools	Floor area (m^2)	2.00%
	University Colleges	Floor area (m^2)	1.90%
	Hotel	Floor area (m^2)	1.20%
	Food Retail	Floor area (m^2)	2.70%
	Nursing Home	Floor area (m^2)	0.80%
	Restaurant	Floor area (m^2)	1.40%
	Hospital	Floor area (m^2)	0.80%
Industrial	Asphalt	Gas Consumption (m^3)	1.00%
	Cement	Gas Consumption (m^3)	3.50%
	Chemicals/Pharmaceutical	Gas Consumption (m^3)	3.50%
	Food & Beverage	Gas Consumption (m^3)	1.00%
	Green House/Agriculture	Gas Consumption (m^3)	1.00%
	Other (including mining, construction, etc.)	Gas Consumption (m^3)	1.00%
	Other Manufacturing <0.5 million m3/year	Gas Consumption (m^3)	1.00%
	Other Manufacturing >0.5 million m3/year	Gas Consumption (m^3)	1.00%
	Petroleum Refining	Gas Consumption (m^3)	1.00%
	Power Generation	Gas Consumption (m^3)	0.00%
	Primary Metals	Gas Consumption (m^3)	-0.40%
	Pulp & Paper	Gas Consumption (m^3)	1.20%

Source: OPA, Demand Forecast 2013 LTEP: Module 1 for Long Term Energy Plan, January 2014, http://www.powerauthority.on.ca/power-planning/long-term-energy-plan-2013. Industrial gas consumption adjusted for intensity trend.

Consumption of natural gas per household or per square metre (m^2) of commercial floor area, referred to as intensity, has decreased over the past decades. Navigant used the Comprehensive Energy Database available from the Office of Energy Efficiency at Natural Resources Canada to analyze natural gas intensities by sector and end use for the period 1990 to 2012. As Figure 2-5 illustrates, the energy used per household for space and water heating has declined over the period, while natural gas use per household for appliances increased up to 2008 and has since declined.

Figure 2-5. Residential Natural Gas Intensity (1990=1)



Source: NRCan Office of Energy Efficiency, Comprehensive Energy Use Database. Data for Natural Gas use for Ontario presented as an index by Navigant.

Natural gas intensity (measured in terms of natural gas use per square metre (m^2) of floor area) decreased in some sectors, while it rose in others (Table 2-4).

Table 2-4: Natural Gas Intensity in Commercial Sector

Commercial Sector Natural Gas Intensities (MJ/1000 m^2 of floor area)	Average Annual Change in Intensity (1990 to 2011)
Wholesale Trade	-0.60%
Retail Trade	-0.70%
Transportation and Warehousing	-0.30%
Information and Cultural Industries	0.30%
Offices	0.40%
Educational Services	-0.10%
Health Care and Social Assistance	0.00%
Arts, Entertainment and Recreation	0.30%
Accommodation and Food Services	-0.30%
Other Services	0.00%

Source: NRCan Office of Energy Efficiency, Comprehensive Energy Use Database. Data for Natural Gas use for Ontario presented as an index by Navigant.

Navigant assumed that the rate of change in natural gas intensity over the period of 1990 to 2011 would continue over the forecast period for both commercial and industrial customers.

Navigant selected floor area as the most appropriate driver for the commercial sector. As a result, an estimate of commercial floor area by segment was required. Navigant used the energy intensities reported in the prior (2009) potential study, with some adjustments, to estimate the floor area by segment represented by Enbridge customers in 2013. Navigant compared the estimated floor area with the estimates used in the 2009 study and publicly available information on commercial floor area for reasonable fit. Navigant then used the resulting baseline floor area as the basis for a forecast of floor area by segment over the study period. Navigant assumed a stock demolition rate of 0.5 percent per year. The resulting changes to the stock of commercial floor area were used to estimate the potential for new construction versus retrofit or replacement measures.

Navigant developed a forecast based on the calibrated 2013 baseline, the change in the underlying driver for each sector/segment and the change in natural gas intensity. The resulting forecast was compared with the Enbridge forecast for 2023, the last year in the Enbridge long term forecast. As Table 2-5 shows, the sales forecast prepared by Navigant matches reasonably well with the long term econometric forecast that Enbridge developed for planning purposes. We note that part of the difference between the Enbridge and Navigant forecast reflects differences in how accounts have been classified between the commercial and industrial sectors. Overall, Navigant's forecast sales for 2023 are within four percent of the level that Enbridge forecasted.

Table 2-5. Reference Sales Forecast

Class/Sector	2023 Reference Forecast (1000m^3)	Enbridge Gas Distribution Forecast (1000m^3)	Projection vs. EGD Forecast
Residential	5,013	5,033	100%
Apartment	1,193	1,199	99%
Commercial	4,302	3,866	111%
Industrial	1,859	1,771	105%
Total	12,366	11,868	104%

Source: Navigant

2.2 *Energy Efficiency Measure/Technology List*

The scope of the project focused on energy efficiency potential associated with measures currently approved by the OEB for inclusion in Enbridge DSM programs, as well as measures which had been characterized as part of the prior energy efficiency potential study carried out in 2009. The focus was on measures that could have a meaningful impact on potential over the study period. The review process resulted in a list of 61 measures, in addition to which Enbridge identified 25. Enbridge staff characterized the costs, savings and applicability of these measures. Navigant conducted a high-level review of the inputs for those measures characterized by Enbridge.

The resulting lists of measures are presented in the following sections describing the characterization of measures for each sector.

2.2.1 Approach to Measure Characterization

Navigant and Enbridge characterized for each measure the incremental cost to implement the measure, any change in operating and maintenance costs, energy and water savings resulting from the measure, measure life and measure applicability. For OEB-approved measures, cost, resource savings, and effective useful life were based on the OEB List of Measures.[7] Information on measures not on the OEB-approved list but which had been included in the prior energy efficiency potential study was derived

[7] *Measures and Assumptions for Demand Side Management (DSM) Planning*, Appendix C: Substantiation Sheets, Presented to Ontario Energy Board by Navigant Consulting Inc., April 16, 2009 (and revised March 24, 2014).

from the sector-specific reports prepared by Marbek Resource Consulting[8]. It should be noted that the OEB List of Measures does not differentiate savings based on the area of the province.

Information regarding the allocation of end use energy, energy intensities, the existing saturation of energy-efficient devices, etc. required to estimate the energy efficiency potential for each measure was derived from a variety of sources, as described in more detail below. The approach taken in developing these characterizations was to use information specific to Enbridge wherever possible. Where utility-specific information was not available, preference was given to information for Ontario or Canada. U.S. data was used where no Canadian data was available or to serve as a point of comparison for quality assurance purposes.

[8] See for example - *Natural Gas Energy Efficiency Potential: Update 2008, Residential Sector Report –Final Report* – Submitted to: Enbridge Gas Distribution, Submitted by: Marbek Resource Consultants Ltd., May 15, 2009.

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2.2.2 Residential Measures

The list of measures for the residential sector included in the energy efficiency potential analysis is presented in Table 2-6.

Table 2-6. Residential Energy Efficiency Measures included in Study

Customer Segment	Energy Efficiency Measures
Space Heating & Ventilation	Furnace Upgrade
	Fireplace Intermittent Ignition Control Retrofit
	High-Efficiency Condensing Furnace
	Programmable Thermostat (Adaptive & WiFi)
	Heating System Zone Control
Water Heating	Combination Space Water Heating System
	High-Efficiency Storage Water Heating
	Low-flow Showerhead
	Tankless Water Heater
	Drain Water Heat Recovery
Pool Heating	Solar Pool Heaters
	Pool Covers
Building Envelope	Attic Insulation
	Above Grade Wall Insulation
	Basement Insulation
	Triple-Glazed Low-E Argon Windows
	Air Sealing
Behavioural Improvement	Mailed Energy Reports

Source: Navigant

Enbridge regularly surveys the residential customers it serves to identify building type and other characteristics of its customers. Navigant used the results of the 2013 *Residential Market Survey* (RMS) to estimate the size of some of the customer segments and the applicability of the end use measures.

Navigant obtained information on housing types by CMA from Statistics Canada. The Toronto CMA covers an area extending as far north as Lake Simcoe and east to Ajax and is therefore reasonably similar in extent to the Enbridge GTA service area. Enbridge does not track the housing type associated with its accounts. As a result, it was necessary to estimate the proportion of residential customers in each structure type. The distribution used in the study was based on Statistics Canada's Household Survey data as shown in Table 2-7.

Table 2-7. Housing Structure Type by CMA

	GTA	Ottawa
Detached	72%	63%
Townhomes & Semi-detached	28%	37%

Source: Estimated distribution based on Stats Canada data; combining Toronto and Niagara CMA's for the GTA.

Housing vintages for the Toronto and Ottawa CMAs were obtained from Statistics Canada, 2011 Census and National Household Survey. A review of insulation requirements in both historical and present Ontario Building Code (OBC) was carried out to determine how base insulation levels had varied depending on the year of construction. Navigant used this information to assess the maximum percentage of homes expected to have a given insulation level. Home vintages are shown in Figure 2-6.

The RMS also provided information on home size (floor area in square feet) in different regions and by structure type (Table 2-8). The survey also reported that 95 percent of the homes surveyed had a basement.

Table 2-8. Residential Floor Area (ft^2)

By Region		By Household Type	
Central West	1,909	Single-detached	1,902
Toronto	1,725	Semi-detached	1,518
Eastern	1,752	Townhouse	1,507
Central East	1,770		
Niagara	1,568		

Source: Enbridge Residential Market Study, 2013.

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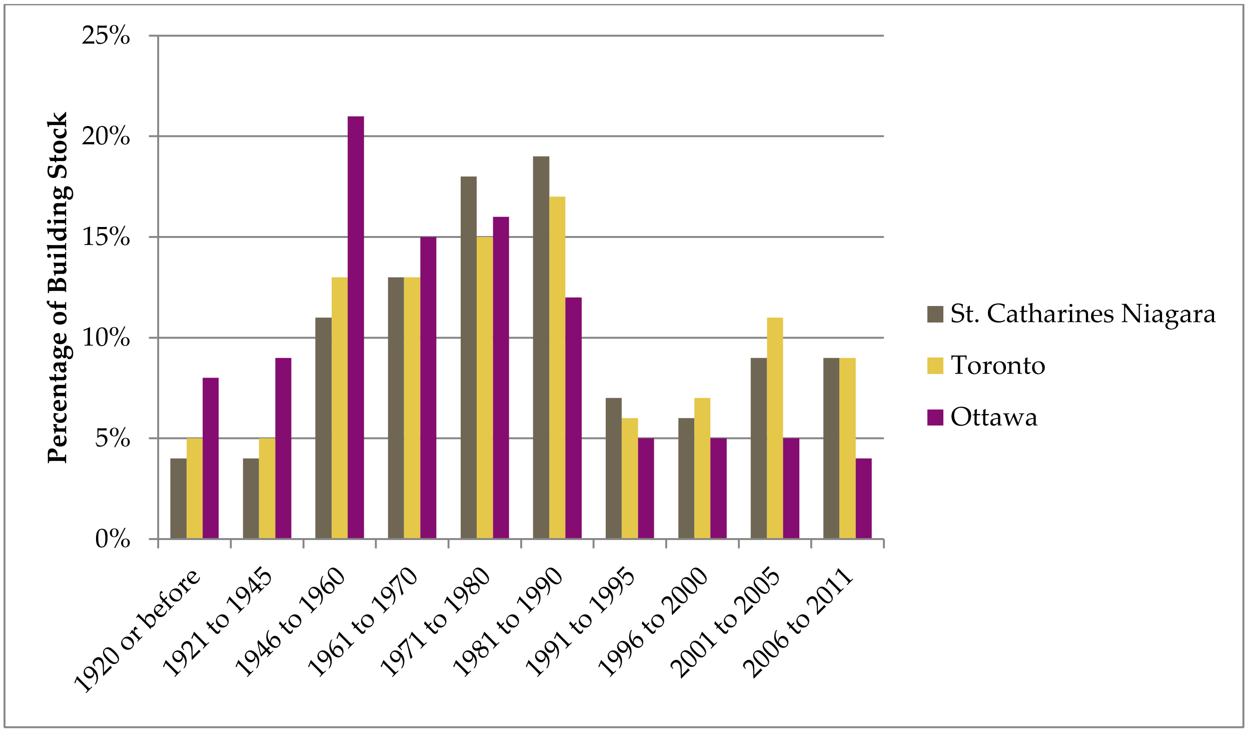
Figure 2-6. OBC Home Vintage



Source: Navigant, based on Ontario Building Codes and Statistics Canada housing data.

The RMS survey also asked customers to indicate the type of windows in their home. Nine percent of customers responded that their home had single pane windows, although it is unclear if all of the windows in their home were single-pane or whether storm windows were used on those single pane windows (Table 2-9).

Table 2-9. Window Types

Windows	% with Window Type[1]
Single Pane	9%
Double Pane	81%
Triple Pane	5%

Source: Enbridge Residential Market Study, 2013.

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As part of the survey, Enbridge calculated the average natural gas consumption by type of home (structure) for homes that participated in the survey (Table 2-10).

Table 2-10. Natural Gas Intensity per Home

Enbridge-Specific N. Gas Intensity by Housing Type	Average annual Gas Consumption (m^3)
Single detached house	2,778
Semi-detached house	2,085
Row or townhouse	1,746

Source: Enbridge Residential Market Study, 2013.

Enbridge provided Navigant with the raw data from the survey used in the market study. Analysis of these data provided information on heating system configurations and the saturations of associated equipment, as shown in Table 2-11.

Table 2-11. Space Heating System Types *(for homes with NG heat)*

Heating System Type		Heating Distribution System	
Forced Air	90%	Forced Air /Ducts	90%
Boiler *(including combination space/ water heating units)*	10%	Baseboards	2%
		Radiators	5%
		In Floor Radiant	2%
Related Equipment Saturations			
Heat Recovery Ventilator	4%		
Infrared Heater	1%		

Source: Navigant analysis of data provided by Enbridge

A comparison of furnace efficiency levels reported in the RMS (Table 2-12) with information available from prior studies and reports indicates a continuing trend towards high-efficiency furnaces. Note that the Survey of Household Energy Use (SHEU) reports on the saturation of gas furnaces in Ontario as a whole.

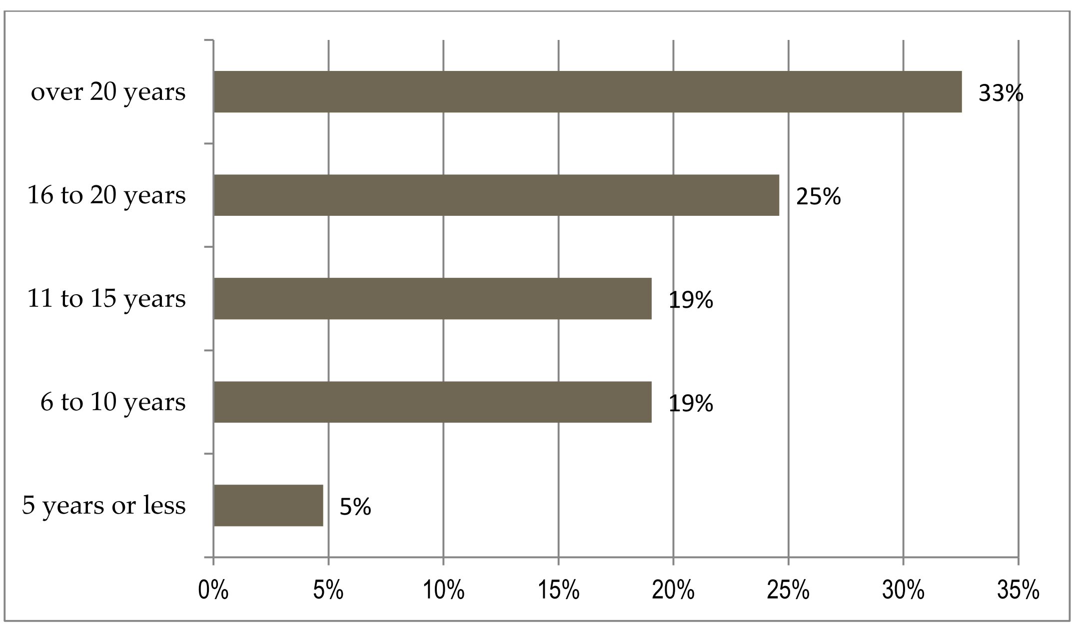
Table 2-12: Furnace Efficiency

Furnace Efficiency Saturations	RMS 2013
Conventional (<75% Efficiency)	7%
Mid-Efficiency (75-90% Efficiency)	31%
High-Efficiency (>90% Efficiency)	62%

Source: Enbridge Market Survey 2013. Calculated as percentage of those who indicated that they knew the efficiency of their system (i.e. excluding "Not Sure" and no answer responses).

As expected, conventional (less than 75 percent efficient) natural gas furnaces are quite old, with almost 60 percent being more than 16 years old, as shown in Figure 2-7. This is reasonably consistent with the history of standards affecting natural gas furnace efficiency.

Figure 2-7. Average Age of Conventional Natural Gas Furnaces



Source: Enbridge Residential Market Survey 2013

The overwhelming majority of homes (88 percent) that Enbridge serves use natural gas for water heating (Table 2-13). Of those using natural gas for heating, 94 percent have a tank system while 6 percent use a tankless or instantaneous water heating system.

Table 2-13. Water Heater Energy Sources

Water Heater Energy Source	% Reporting
Natural Gas	88%
Electric	11%
Other	2%

Source: Enbridge Residential Market Survey 2013

Customers who use a system with a water heater tank were asked whether their system was vented up a chimney or through the side of a wall (Table 2-14). Fifty-two percent of those who responded indicated that their system was vented through a wall. The average age of water heater tanks was found to be 7 years.[9]

Table 2-14. Water Heater Characteristics

Type of Water Heater	% Reporting
Vented up a chimney	42%
Vented through the side of a wall	52%
Tankless	6%
Avg. Age of Water Heater Tanks	7 years

Source: Enbridge Residential Market Survey 2013

[9] All statistics based on EGD Residential Market Survey 2013.

The RMS asked customers how many bathrooms (full and half baths) were in their homes. The number of showers and faucets were estimated base on that information (Table 2-15).

Table 2-15. Showers and Faucets

For Homes with NG Water Heating:	Detached	Attached	Apartments (>4 Storeys)	All
No. of Bathrooms	1.9	1.6	1.6	1.9
No. of 1/2 Baths	1	1	0.3	
Implied number of bath faucets	2.9	2.6	1.9	

Notes: Assumes 1 kitchen (and kitchen faucet) per home and number of showers is equal to number of bathrooms.

Source: Navigant analysis; data from Enbridge RMS 2013

The prior energy efficiency potential study (Marbek 2009) reported that 27 percent of domestic hot water load was driven by clothes washing.[10] The RMS found that 41 percent of customers now use a front loading washer, which significantly reduces water use (Table 2-16). The survey did not include information on the wash/rinse temperatures used for laundry.

Table 2-16. Laundry Equipment

Type of Washer	% Reporting
Top-Loading Washer	45%
Front Loading Washer	41%

Source: Enbridge Residential Market Survey 2013

[10] *Natural Gas Energy Efficiency Potential: Update 2008, Residential Sector Report – Final Report* – Submitted to: Enbridge Gas Distribution, Submitted by: Marbek Resource Consultants Ltd., May 15, 2009, Exhibit 2.8.

Saturations of other gas-fired equipment were also obtained from the RMS (Table 2-17). One in 20 respondents reported using a gas-fired pool heater, and of those, 65 percent indicated that they use a pool blanket to reduce heat loss.

Table 2-17. Other Gas-Fired Equipment

Equipment Saturations	% of Homes with Equipment
Gas Fireplace	42%
Pool Heater	5%
Pool Blanket (for those w/pools)	65%

Source: Enbridge Residential Market Survey 2013

As discussed in Section 2.1.1, Navigant characterized the costs and savings for residential measures based on information from the OEB List of Measures and the prior potential analysis that Marbek completed. Table 2-18 describes other sources of information used in identifying current market conditions and measure densities.

Table 2-18. Data Sources for Measure Characterization Parameters

Measure Input	Data Sources
Measure Costs	OEB List of Measures, Marbek Residential Sector report (2009), Enbridge program data (for measures characterized by Enbridge).
Measure Savings	OEB List of Measures, Marbek Residential Sector report (2009), Enbridge program data (for measures characterized by Enbridge).
Measure Densities & Baseline Conditions	Enbridge Market Survey (2013), Natural Resources Canada Office of Energy Efficiency Comprehensive Energy Use Database, NRCan Survey of Household Energy Use, Statistics Canada, Ontario Building Codes.

Source: Navigant analysis, 2014

2.2.3 Commercial Measures

The list of measures for the commercial sector used the analysis is presented in Table 2-19.

Table 2-19. Commercial Energy Efficiency Measures included in Study

Customer Segment	Energy Efficiency Measures
Space Heating & Ventilation	High Performance Glazing
	Super High Performance Glazing
	Wall Insulation Upgrade
	Roof Insulation Upgrade
	Air Sealing
	Air Curtains
Heating, Ventilation and Air Conditioning (HVAC)	Condensing Boilers
	High-Efficiency (Near Condensing) Boilers
	Building Controls and Automation Systems
	Steam Boiler Replacement
	Condensing Unit Heaters
	Dedicated Outdoor Air Systems
	Steam System Efficiency Measures
	De-stratification Fans
	Heat Reflector Panels
	Heat/Energy Recovery Ventilation
	Demand Control Ventilation
	Variable Frequency Drive
	Demand Control Kitchen Ventilation
	Infrared Heaters
Water Heating	Condensing Water Heaters
	Tankless Water Heaters
	Waste Water Heat Recovery
	Low-flow Showerheads
Laundry	High Extraction Washers
	Ozone Laundry
Cooking	Efficient Gas Griddles

Customer Segment	Energy Efficiency Measures
	Efficient Gas Broilers
	Efficient Gas Ovens
	Energy Star Gas Fryers
	Efficient Gas Range Tops
Operational Improvements	"Run It Right"

Source: Navigant

Limited information regarding the state of the commercial market and the saturation of energy efficiency measures was available specific to Enbridge customers. As a result, Navigant derived baseline information from prior studies and secondary sources where it was not available from Enbridge program experience.

End use energy was allocated by end use based on information reported in the prior potential study, mapped to the segments used in the current analysis (Table 2-20).

Table 2-20. End Use Allocations in Commercial Sector

Customer Segment	Appliances/ Other	Space Heating	Water Heating
Multi-Residential	2.5%	73.5%	24.0%
Office - Large	13.6%	77.6%	8.9%
Office - Small	4.4%	88.4%	7.1%
Schools	0.5%	93.2%	6.3%
Colleges & Universities	5.7%	82.4%	11.9%
Logistics & Warehouses	3.3%	92.7%	4.0%
Hospital	5.8%	78.7%	15.6%
Long Term Care	7.2%	71.0%	21.9%
Accommodation	6.5%	59.5%	34.0%
Food Service	0.7%	71.1%	28.2%
Retail - Large	3.3%	91.5%	5.3%
Retail - Small	4.0%	88.8%	7.2%

Source: Navigant, based on prior potential study.

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As discussed in Section 2.1.1 , Navigant characterized the costs and savings for commercial measures based on information from the OEB List of Measures and the prior potential analysis completed by Marbek. Table 2-21 describes other sources of information used in identifying current market conditions and measure densities.

Table 2-21. Data Sources for Measure Characterization Parameters

Measure Input	Data Sources
Measure Costs	OEB List of Measures, Marbek Residential Sector report (2009), Enbridge program data (for measures characterized by Enbridge).
Measure Savings	OEB List of Measures, Marbek Residential Sector report (2009), Enbridge program data (for measures characterized by Enbridge).
Measure Densities & Baseline Conditions	Enbridge Boiler Study, Enbridge program data, Natural Resources Canada Office of Energy Efficiency Comprehensive Energy Use Database, NRCan/OEE Commercial and Institutional Building Energy Use Survey 2000 and Survey of Commercial and Institutional Energy Use, Statistics Canada, and Ministry of Health.

Source: Navigant

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2.2.4 Industrial Measures

The list of measures for the industrial sector used the analysis is presented in Table 2-22.

Table 2-22. Industrial Energy Efficiency Measures included in Study

Customer Segment	Energy Efficiency Measures
Boiler, Steam & Hot Water System	Feed Water Economizers
	Condensing Economizers
	Blow-down Heat Recovery and Control
	Boiler Combustion Air Preheat
	Heat Recovery to Preheat Make-up Water
	Condensing Boiler
	Direct Contact Hot Water Heaters
	Boiler Right Sizing and Load Management
	High-efficiency Burner
	Insulation
	Advanced Boiler Controls (including air/fuel mix control)
	Condensate Return
	Burn Digester/Flare Gas in Boilers
	Steam Trap Survey and Repair
	Reduce Boiler Steam Pressure
Process Heating	Exhaust Gas Heat Recovery
	High-efficiency Burners
	Insulation
	Advanced Heating and Process Control
	High-efficiency Ovens & Dryers
	High-efficiency Furnaces
	Regenerative Thermal Oxidizers
	Reduced Furnace Openings (air & chain curtains)
	Process Heat Recovery
	Process Improvement (changing cleaning chemicals, set points, exhaust, moisture control, etc.)
	Optimize Combustion
	Preheat Charge (hot charging) in Melting and Reheat

Customer Segment	Energy Efficiency Measures
	Furnaces
Heating & Ventilation	Radiant Heaters
	Automated Temperature Control
	Ventilation Optimization
	Warehouse Loading Dock Seals
	Air Curtains
	Air Compressor Heat Recovery
	De-stratification Fans
	Ventilation Heat Recovery
System Measures	Energy Management Improvements (*Operational, Behavioural, Monitoring & Targeting, ISO 50001)*

Source: Navigant

As in the commercial sector, limited Enbridge-specific information was available regarding the state of the industrial market and the saturation of energy efficiency measures. As a result, Navigant derived baseline information from prior studies and secondary sources where it was not available from Enbridge program experience. Moreover, Navigant used data from NRCan and Canadian Industry Program for Energy Conservation (CIPEC) reports, as well as U.S. data sources, such as the Energy Information Administration's (EIA's) Manufacturers Energy Consumption Survey in characterizing industrial energy use and energy efficiency.

End use energy was allocated by end use based on the distribution of natural gas use reported in the EIA Manufacturers Energy Survey (MECS)[11], mapped to the segments used in the current analysis (Table 2-23). The MECS data does not report on energy use in agriculture or greenhouses. As a result, Navigant developed an estimate of energy consumption by end use based on industry sources and reviewed with Enbridge.

Table 2-23. End Use Allocation in Industrial Sector

Customer Segment	Process Equipment	Process Heat	Process - Boiler/ Steam	Space Cooling	Space Heating & Vent.	Water Heating	Other
Asphalt	5.50%	76.30%	13.20%	0.30%	2.60%	0.30%	0.80%
Cement	0.70%	53.30%	20.00%	0.00%	20.00%	6.70%	0.00%
Chemicals/ Pharmaceutical	6.60%	35.00%	56.00%	0.50%	1.30%	0.20%	0.40%
Food & Beverage	1.90%	29.70%	58.20%	0.40%	5.80%	2.50%	1.30%
Green House/ Agriculture	0.00%	15.00%	75.00%	0.00%	10.00%	0.00%	0.00%
Other (including mining, construction, etc.)	0.80%	86.40%	3.80%	0.00%	5.70%	0.40%	2.40%
Other Manufacturing >0.5 million m3/year	0.70%	53.30%	20.00%	0.00%	20.00%	6.70%	0.00%
Other Manufacturing <0.5 million m3/year	0.70%	53.30%	20.00%	0.00%	20.00%	6.70%	0.00%
Petroleum Refining	4.90%	55.30%	33.30%	0.70%	0.20%	0.00%	5.50%
Primary Metals	5.40%	75.10%	11.90%	0.60%	6.10%	0.60%	0.20%
Pulp & Paper	3.10%	30.20%	60.50%	0.00%	3.60%	0.30%	2.60%

Source: Navigant estimate based on MECs data. Cement sector set to reflect other manufacturing due to type of customers served by Enbridge.

[11] Industrial estimates based on U.S. EIA Manufacturers Energy Consumption Survey (MECS), Table 5.1 - End Uses of Fuel Consumption, 2010 (released March 2013)

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As discussed in Section 2.1.1, Navigant and Enbridge characterized the costs and savings for industrial measures based on information from past customer projects, manufacturer's cost data, and the prior potential analysis that Marbek completed. Table 2-24 describes other sources of information used in identifying current market conditions and measure densities.

Table 2-24. Data Sources for Measure Characterization Parameters

Measure Input	Data Sources
Measure Costs	OEB List of Measures, Marbek Residential Sector report (2009), Enbridge program data (for measures characterized by Enbridge).
Measure Savings	OEB List of Measures, Marbek Residential Sector report (2009), Enbridge program data (for measures characterized by Enbridge).
Measure Densities & Baseline Conditions	Enbridge Boiler Study, Enbridge program data and knowledge of customer base, Natural Resources Canada Office of Energy Efficiency Comprehensive Energy Use Database, NRCan CIPEC[1] Benchmarking reports and Guides to Energy Efficiency, Statistics Canada, US EIA MECS.

Source: Navigant analysis, 2014

3 Technical Potential Forecast

This section describes the technical savings potential, which is the upper bound on potential, available in Enbridge's service territories. The section first explains Navigant's approach to calculating technical potential and then presents the baseline results for technical potential.

3.1 Approach to Estimating Technical Potential

Technical potential is defined as the energy savings that can be achieved assuming that all installed measures can *immediately* be replaced with the "efficient" measure/technology, wherever technically feasible, regardless of the cost, market acceptance, or whether a measure has failed and must be replaced.

Navigant used its state-of-the-art DSMSim model to estimate the technical and economic savings potential for demand side resources in Enbridge's service territory. DSMSim is a bottom-up technology-diffusion and stock-tracking model implemented using a System Dynamics framework.[12]

Navigant's modelling approach considers an energy-efficient measure to be any change made to a building, piece of equipment, process, or behaviour that could save energy. The savings can be defined in numerous ways, depending on which method is most appropriate for a given measure. Measures like condensing water heaters are best characterized as some fixed amount of savings per water heater; savings for measures like commercial automated building controls are typically characterized as a percentage of customer segment consumption; and, lastly, measures like industrial ventilation heat recovery are well-suited for estimating energy savings as a percentage of end use consumption. The DSMSim model can appropriately handle savings characterizations for all three methods.

The calculation of technical potential in this study differs depending on the assumed measure replacement type. Technical potential is calculated on a per-measure basis and includes estimates of savings per unit, measure density (e.g., quantity of measures per home) and total building stock in each service territory. The study accounts for three replacement types, where potential from retrofit and replace-on-burnout measures are calculated differently from potential for new measures. The formulae used to calculate technical potential by replacement type are shown below.

[12] See Sterman, John D. *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Irwin McGraw-Hill. 2000 for detail on System Dynamics modelling. Also see http://en.wikipedia.org/wiki/System_dynamics for a high-level overview.

3.1.1 New Construction (NEW) Measures

Similar to replace-on-burnout measures, the cost of implementing new measures is incremental to the cost of a baseline (and less efficient) measure. However, new construction technical potential is driven by equipment installations in new building stock rather than by equipment in existing building stock.[13] New building stock is added to keep up with forecast growth in total building stock and to replace existing stock that is demolished each year. Demolished (sometimes called replacement) stock is calculated as a percentage of existing stock in each year, and this study uses a demolition rate of 0.5 percent per year. New building stock (the sum of growth in building stock and replacement of demolished stock) determines the incremental annual addition to technical potential which is then added to totals from previous years to calculate the total potential in any given year. The equations used to calculate technical potential for new construction measures are provided below.

Annual Incremental Technical Potential (AITP):

$$AITP_{YEAR} = \text{New Buildings}_{YEAR} \text{ (e.g., buildings/year}^{14}\text{) X Measure Density (e.g., widgets/building) X Savings}_{YEAR} \text{ (e.g., } m^3\text{/widget) X Technical Suitability (dimensionless)}$$

Total Technical Potential (TTP):

$$TTP_Y = \sum_{YEAR=2015}^{YEAR=2024} AITP_{YEAR}$$

3.1.2 Retrofit (RET) and Replace-On-Burnout (ROB) Measures

Retrofit measures, commonly referred to as advancement or early-retirement measures, are replacements of existing equipment before the equipment fails. Retrofit measures can also be efficient processes that are not currently in place and that are not required for operational purposes. Retrofit measures incur the full cost of implementation rather than incremental costs to some other baseline technology or process because the customer could choose not to replace the measure and would therefore incur no costs. In contrast, replace-on-burnout measures, sometimes referred to as lost-opportunity measures, are replacements of existing equipment that have failed and must be replaced, or they are existing processes that must be renewed. Because the failure of the existing measure requires a capital investment by the customer, the cost of implementing replace-on-burnout measures is always incremental to the cost of a baseline (and less efficient) measure.

Retrofit and replace-on-burnout measures have a different meaning for technical potential compared with NEW measures. In any given year, the entire building stock is used for the calculation of technical

[13] In some cases, customer-segment-level and end use-level consumption/sales are used as proxies for building stock. These consumption/sales figures are treated like building stock in that they are subject to demolition rates and stock-tracking dynamics.

[14] Units for new building stock and measure densities may vary by measure and customer segment (e.g., 1,000 square feet of building space, number of residential homes, customer-segment consumption/sales, etc.)

potential.[15] This method does not limit the calculated technical potential to any pre-assumed rate of adoption of retrofit measures. Existing building stock is reduced each year by the quantity of demolished building stock in that year and does not include new building stock that is added throughout the simulation. For RET and ROB measures, annual potential is equal to total potential, thus offering an *instantaneous* view of technical potential. The equation used to calculate technical potential for retrofit measures is provided below.

Annual/Total Gas Savings Potential:

Total Potential = Existing Building Stock $_{\text{YEAR}}$ (e.g., buildings[16]) X Measure Density (e.g., widgets/building) X Savings $_{\text{YEAR}}$ (e.g., m^3/widget) X Technical Suitability (dimensionless)

3.1.3 Competition Groups

Navigant's modelling approach recognizes that some efficient technologies will compete against each other in the calculation of potential. The study defines "competition" as efficient measures competing for the same installation as opposed to competing for the same savings (e.g., windows vs. furnaces) or for the same budget (e.g., lighting vs. water heating). For instance, a consumer may install a condensing or near-condensing water heater, both of which belong to the same competition group, as only one of these would be installed. General characteristics of competing technologies used to define competition groups in this study include the following:

- Competing efficient technologies share the same *baseline* technology characteristics, including baseline technology densities, costs, and consumption.
- The total (baseline plus efficient) maximum densities of competing efficient technologies are the same.
- Installation of competing technologies is mutually exclusive (i.e., installing one precludes installation of the others for that application).
- Competing technologies share the same replacement type (RET, ROB, or NEW).

To address the overlapping nature of measures within a competition group, Navigant's analysis only selects one measure per competition group to include in the *summation* of technical potential across measures (e.g., at the end use, customer segment, sector, service territory, or total level). The measure with the largest gas savings potential in a given competition group is used for calculating total technical potential of the competition group. This approach ensures that double-counting is not present in the reported technical potential, though the technical potential for each individual measure is still calculated and reported.

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[15] In some cases, customer-segment-level and end use-level consumption/sales are used as proxies for building stock. These consumption/sales figures are treated like building stock in that they are subject to demolition rates and stock-tracking dynamics.

[16] Units for building stock and measure densities may vary by measure and customer segment (e.g., 1,000 square feet of building space, number of residential homes, customer-segment consumption/sales, etc.).

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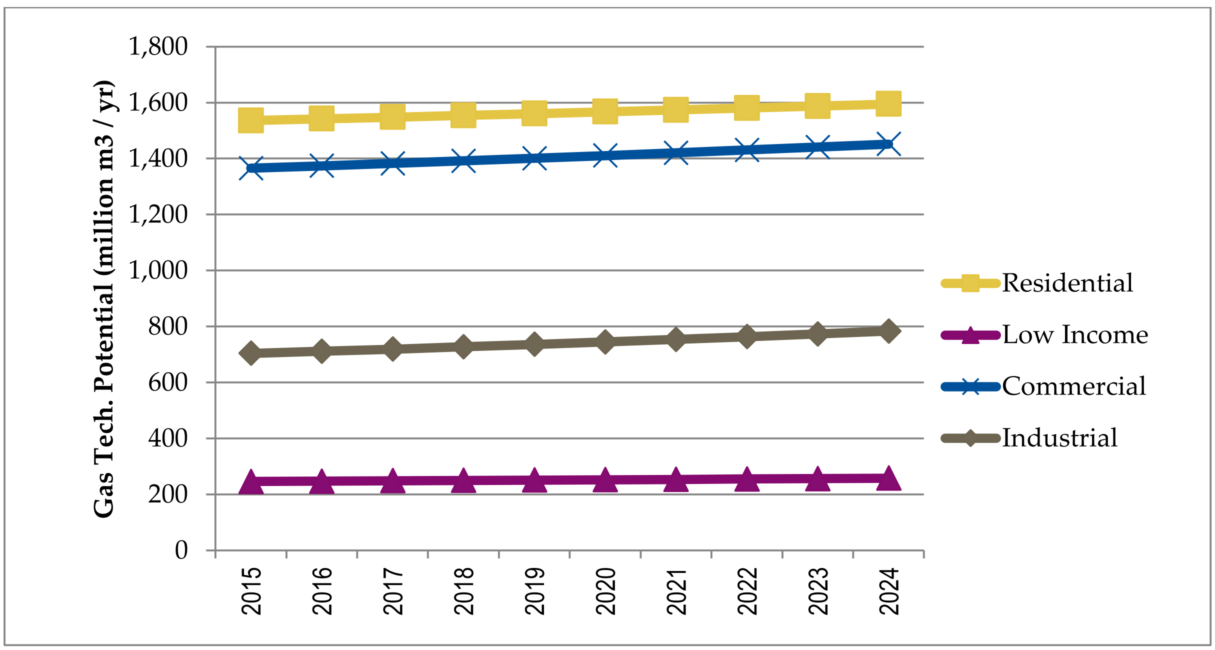
3.2 *Technical Potential Results*

This sub-section provides DSMSim results pertaining to natural gas savings total technical potential at different forms of aggregation. Results are shown by sector, customer segment, end use and highest-impact measures.

3.2.1 Results by Sector

Figure 3-1 and Table 3-1 show the total technical potential by sector and highlight that the residential and commercial sectors provide the majority of the total technical potential. The allocation of technical potential among sectors is comparable with the allocation of forecasted sales among sectors. As previously noted, all savings reported in this study are gross, rather than net, meaning that the effect of possible free ridership is not included in the reported savings, per Enbridge's guidance and for consistency and ease of comparison with past studies.

Figure 3-1. Gas Savings Technical Potential by Sector (million m³/year)



Source: Navigant analysis, 2014

Table 3-1. Gas Savings Technical Potential by Sector (million m³/year)

Year	Residential	Low Income	Commercial	Industrial	Total
2015	1,536	246	1,365	704	3,851
2016	1,542	247	1,374	711	3,874
2017	1,548	248	1,382	719	3,898
2018	1,554	250	1,391	727	3,922
2019	1,560	251	1,401	736	3,948
2020	1,567	252	1,410	745	3,974
2021	1,574	254	1,420	754	4,001
2022	1,580	255	1,430	763	4,029
2023	1,587	256	1,441	773	4,058
2024	1,594	258	1,452	784	4,087

Source: Navigant analysis, 2014

Table 3-2 provides the technical gas savings potential as a percentage of sector sales. This perspective shows that the residential sector has the greatest technical potential as a percentage of sales. Additionally, the commercial sector's savings as a percentage of sales declines over time due to the changing mix of new and existing building stock, even though savings potential grows in absolute terms.

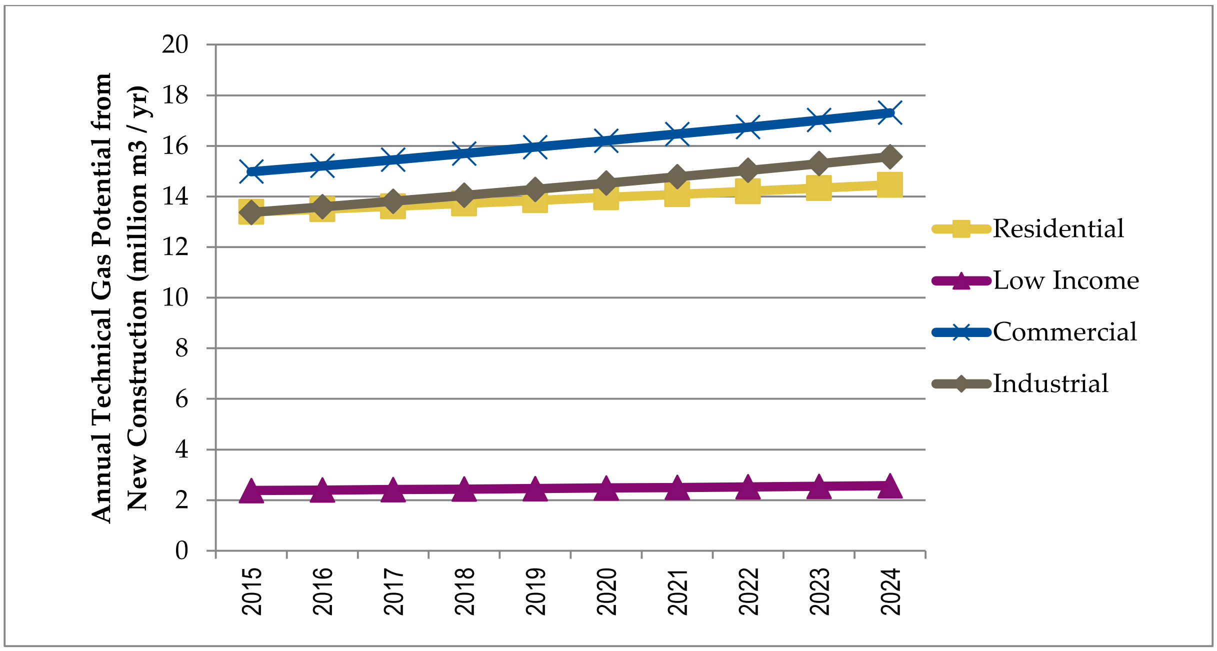
Table 3-2. Gas Savings Technical Potential as a Percentage of Sector Sales

Year	Residential	Low Income	Commercial	Industrial	Total
2015	47%	39%	28%	38%	36%
2016	47%	39%	28%	38%	36%
2017	47%	39%	28%	38%	36%
2018	47%	39%	28%	38%	36%
2019	47%	39%	27%	38%	36%
2020	47%	39%	27%	38%	35%
2021	47%	39%	27%	38%	35%
2022	47%	39%	26%	38%	35%
2023	47%	39%	26%	38%	35%
2024	47%	39%	26%	38%	35%

Source: Navigant analysis, 2014

The technical gas potential from new construction only (compared with the combined savings from new construction and existing buildings shown above) accounts for 469 m^3 per year, or 11 percent of total technical potential, and is provided in Figure 3-2 and Table 3-3. New construction potential shown below represents the savings from all newly constructed facilities (starting in 2015) over time. The annual new construction technical potential grows over time since the annual growth in new buildings grows over time. Thirty-four (34) percent of the total new construction potential comes from the commercial sector by 2024; 31 percent is from the industrial sector; 30 percent is from the residential sector, and 5 percent is provided by the low income sector.

Figure 3-2. Gas Savings Annual Technical Potential for New Construction (million m^3/year)



Source: Navigant analysis, 2014

Table 3-3. Gas Savings Annual Technical Potential for New Construction (million m^3/year)

Year	Residential	Low Income	Commercial	Industrial	Total
2015	13	2	15	13	44
2016	13	2	15	14	45
2017	14	2	15	14	45
2018	14	2	16	14	46
2019	14	2	16	14	47
2020	14	2	16	15	47
2021	14	3	16	15	48
2022	14	3	17	15	48
2023	14	3	17	15	49
2024	14	3	17	16	50
Total	139	25	161	144	469

Source: Navigant analysis, 2014

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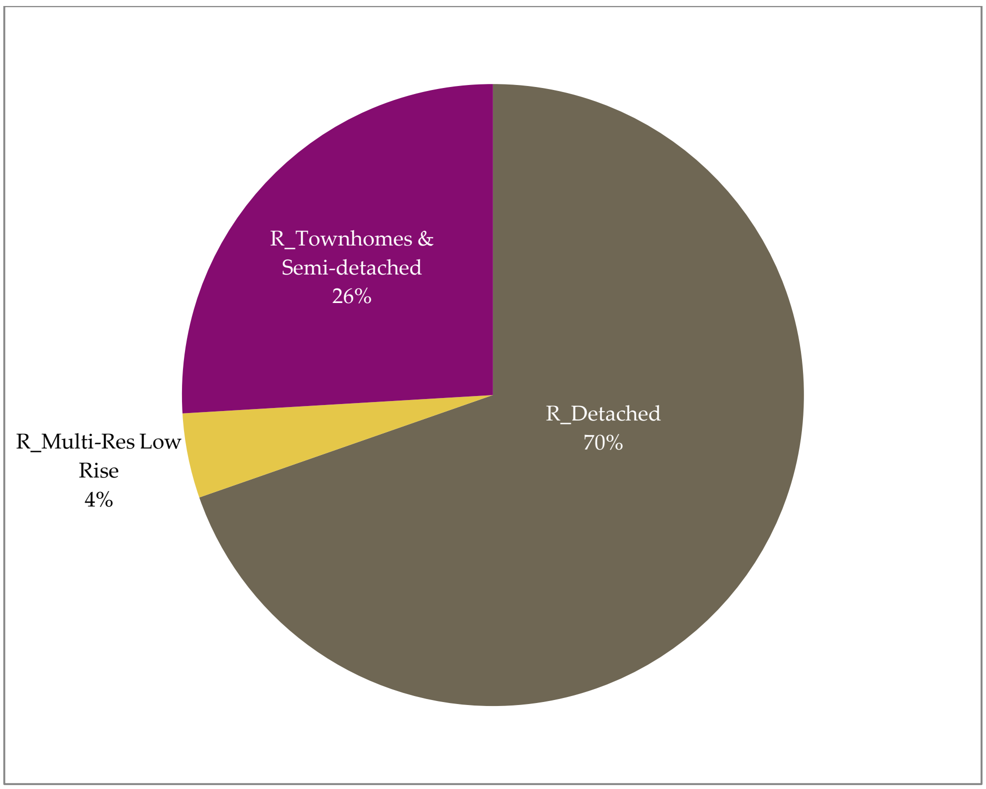
3.2.2 Results by Customer Segment

The gas savings technical potential shown in Figure 3-3 and Table 3-4 is broken out by residential customer segments. Gas potential from the residential sector is heavily dominated by the "detached" and "townhomes and semi-detached" customer segments. Residential gas sales are largely driven by these two customer segments, which is consistent with their comparably large contribution to savings potential. "Triple-glazed, low-E, argon windows", "basement insulation", and "air sealing" are three top saving residential measures that add considerable potential to the "detached" and "townhomes and semi-detached" customer segments.

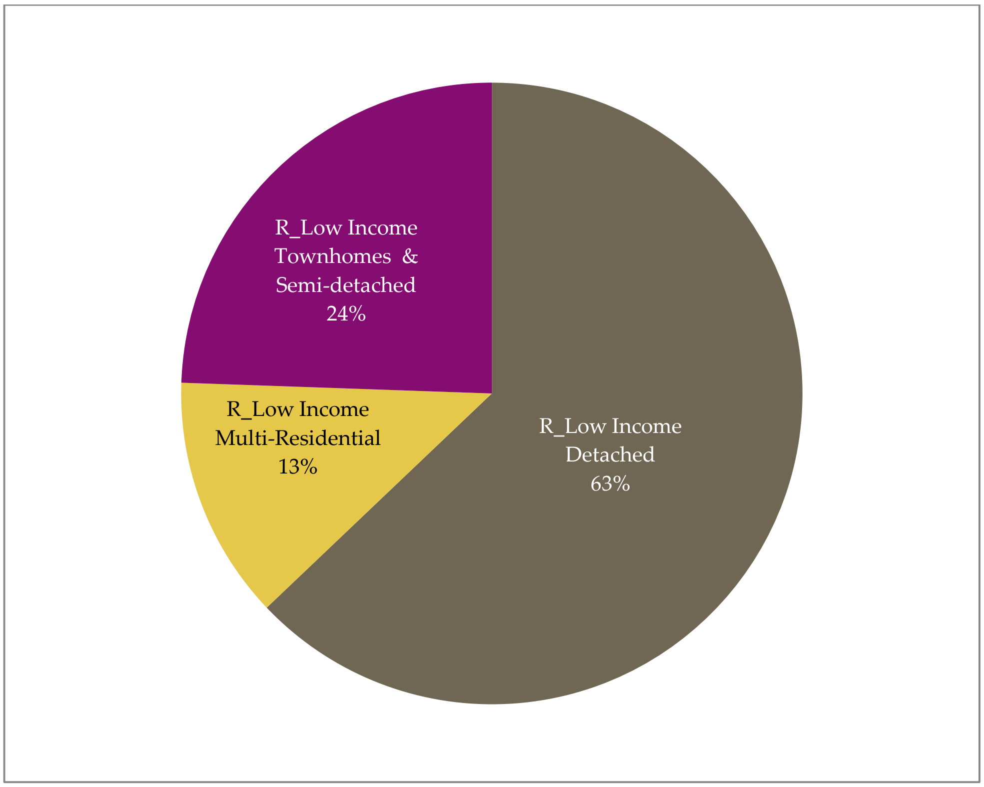
Figure 3-3. Gas Savings Technical Potential by Residential Customer Segment in 2024



Source: Navigant analysis, 2014

The gas technical potential shown in Figure 3-4 and Table 3-5 is broken out by low income customer segments. Gas potential from the low income sector follows a similar distribution to the residential sector, except that the multi-residential customer segment has a larger share of potential.

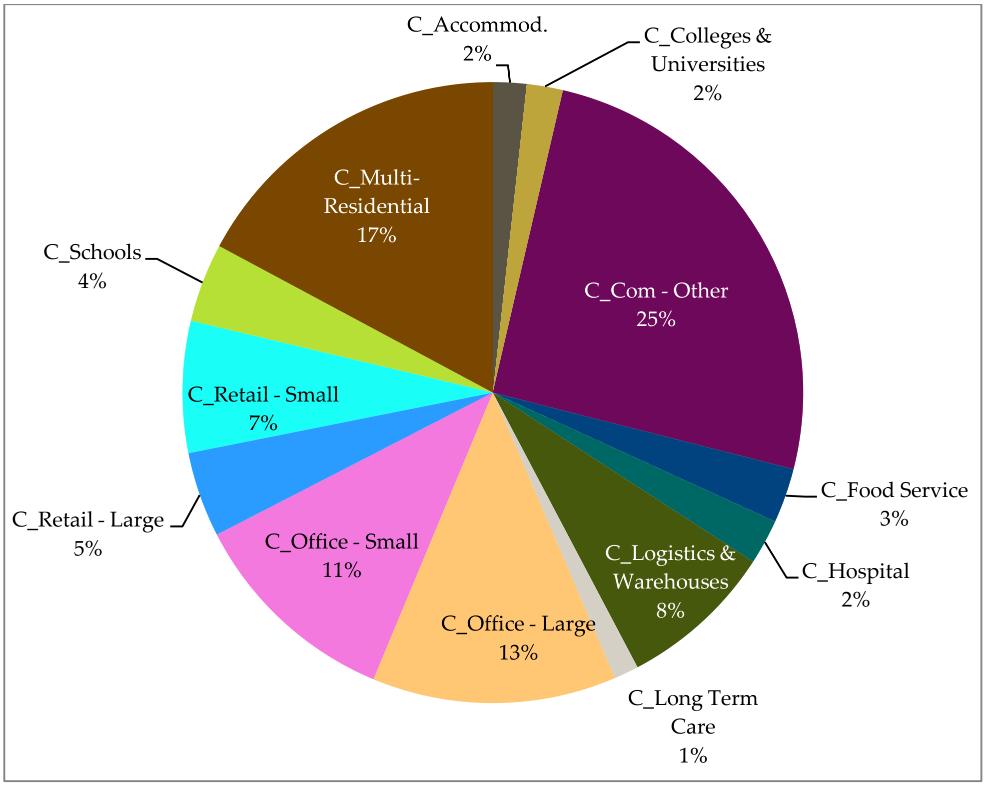
Figure 3-4. Gas Savings Technical Potential by Low Income Customer Segment in 2024



Source: Navigant analysis, 2014

The gas technical potential shown in Figure 3-5 and Table 3-6 is summarized by commercial customer segment. The three customer segments providing the most technical potential are the other commercial, multi-residential and large office segments. These customer segments also account for the greatest forecast gas sales in the commercial sector by 2024.

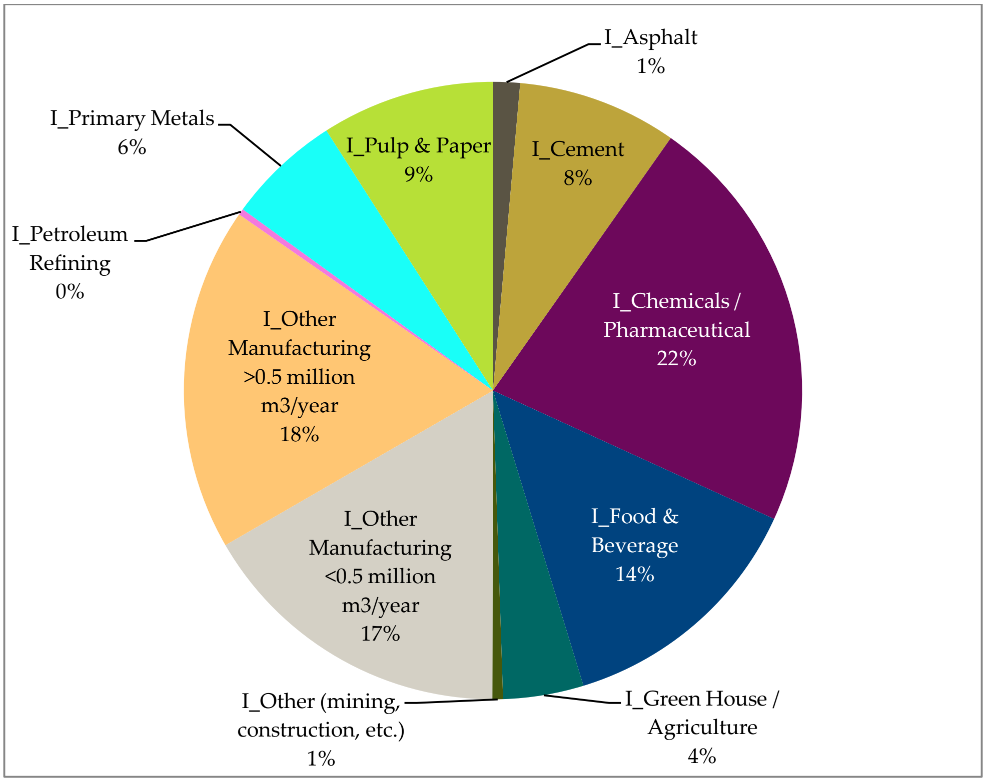
Figure 3-5. Gas Savings Technical Potential by Commercial Customer Segment in 2024



Source: Navigant analysis, 2014

Figure 3-6 and Table 3-7 show the gas technical potential summarized by industrial customer segment. Chemicals and pharmaceuticals, other manufacturing and food and beverage customer segments account for a significant percentage of the industrial potential. Similar to the other sectors, these customer segments also account for the greatest forecast gas sales in the industrial sector.

Figure 3-6. Gas Savings Technical Potential by Industrial Customer Segment in 2024



Source: Navigant analysis, 2014

Table 3-4. Gas Savings Technical Potential by Residential Customer Segment (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
R_Detached	1,071	1,075	1,079	1,084	1,088	1,092	1,097	1,101	1,106	1,111
R_Multi-Residential Low Rise	65	66	66	67	67	68	68	69	70	70
R_Townhomes & Semi-detached	399	401	402	404	405	407	408	410	412	414
Totals	1,536	1,542	1,548	1,554	1,560	1,567	1,574	1,580	1,587	1,594

Source: Navigant analysis, 2014

Table 3-5. Gas Savings Technical Potential by Low Income Customer Segment (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
R_Low Income Detached	155	156	157	157	158	159	160	160	161	162
R_Low Income Multi-Residential	30	30	31	31	31	32	32	32	32	33
R_Low IncomeTownhomes & Semi-detached	61	61	61	61	62	62	62	62	63	63
Totals	246	247	248	250	251	252	254	255	256	258

Source: Navigant analysis, 2014

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Table 3-6. Gas Savings Technical Potential by Commercial Customer Segment (million m^3/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
C_Accommodation	25	25	25	25	25	25	25	25	25	25
C_Colleges & Universities	23	23	24	24	25	25	26	26	27	27
C_Com - Other	321	326	330	335	340	345	351	356	362	368
C_Food Service	40	40	40	40	41	41	41	41	41	41
C_Hospital	34	34	34	34	34	34	34	34	34	34
C_Logistics & Warehouses	115	115	115	116	116	116	117	117	117	118
C_Long Term Care	18	19	19	19	19	19	19	19	19	19
C_Office - Large	179	179	180	181	181	182	183	183	184	185
C_Office - Small	154	155	156	157	158	158	159	160	161	162
C_Retail - Large	59	60	60	61	61	62	63	63	64	64
C_Retail - Small	93	93	94	95	95	96	97	98	99	99
C_Schools	55	55	56	56	57	57	58	58	59	60
C_Multi-Residential	249	249	249	249	249	249	249	249	249	249
Totals	1,365	1,374	1,382	1,391	1,401	1,410	1,420	1,430	1,441	1,452

Source: Navigant analysis, 2014

Table 3-7. Gas Savings Technical Potential by Industrial Customer Segment (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
I_Asphalt	9	9	10	10	10	10	10	11	11	11
I_Cement	47	49	51	53	55	57	59	61	63	65
I_Chemicals / Pharmaceutical	157	158	160	162	164	166	167	169	171	173
I_Food & Beverage	87	89	91	93	95	97	99	101	103	105
I_Green House / Agriculture	27	28	29	29	30	30	31	32	32	33
I_Other (including mining, construction, etc.)	4	4	4	4	4	4	4	4	4	4
I_Other Manufacturing <0.5 million m3/year	108	110	113	115	117	120	122	125	128	130
I_Other Manufacturing >0.5 million m3/year	117	119	122	125	127	130	133	135	138	141
I_Petroleum Refining	3	3	3	3	3	3	3	3	3	3
I_Primary Metals	64	62	59	57	55	54	52	50	48	47
I_Pulp & Paper	81	79	78	77	76	75	74	73	72	71
Totals	704	711	719	727	736	745	754	763	773	784

Source: Navigant analysis, 2014

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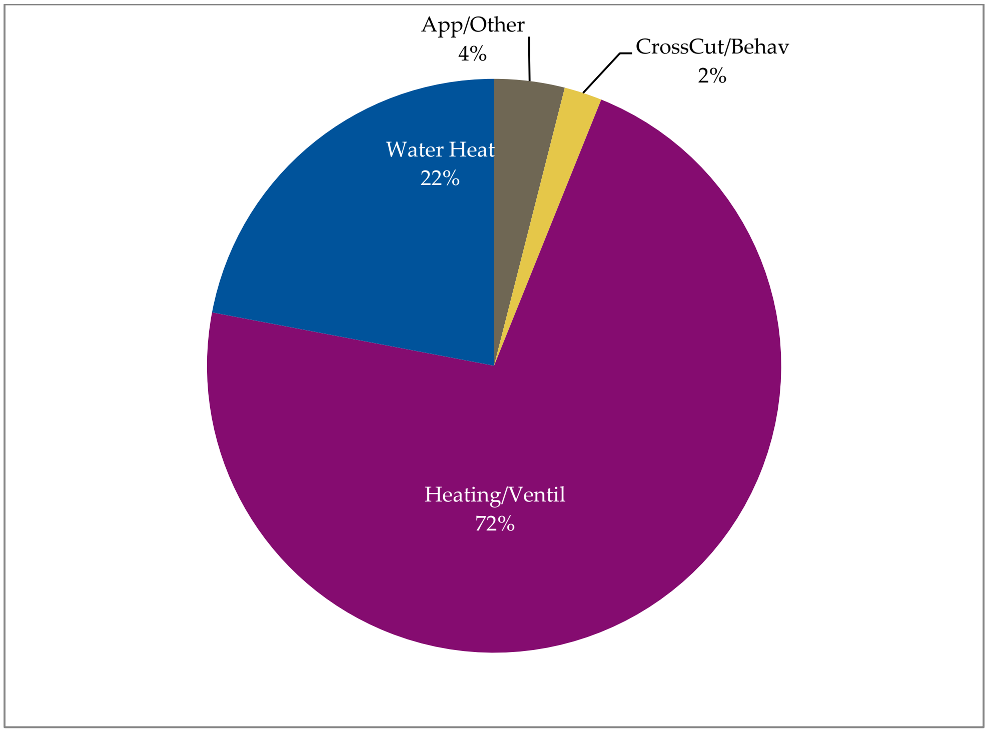
3.2.3 Results by End Use

Technical potential is broken out by residential end use in Figure 3-7 and Table 3-8. Heating and ventilation measures account for just under three-fourths of the residential technical potential, while water heating accounts for roughly the other fourth. A comparatively small percentage of gas technical savings are achieved by the "appliances and other" and the "cross-cutting and behavioural" end uses. Three of the top ten residential measures for technical potential fall in the water heating end use category, with the remaining seven of the top ten residential measures related to heating and ventilation. The "appliances and other" end use consists of measures driven largely by pool energy consumption. Additionally, behavioural mailed reports are an effective gas-saving measure in the cross-cutting and behavioural end use category.

Figure 3-7. Gas Savings Technical Potential by Residential End Use in 2024



Source: Navigant analysis, 2014

Table 3-8. Gas Savings Technical Potential by Residential End Use (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
App/Other	64	64	64	64	64	64	63	63	63	63
CrossCut/Behav	30	31	31	31	32	32	33	33	34	34
Heating/Ventil	1,134	1,135	1,136	1,137	1,138	1,140	1,141	1,143	1,144	1,146
Water Heat	308	312	317	322	326	331	336	341	346	351
Total	1,536	1,542	1,548	1,554	1,560	1,567	1,574	1,580	1,587	1,594

Source: Navigant analysis, 2014

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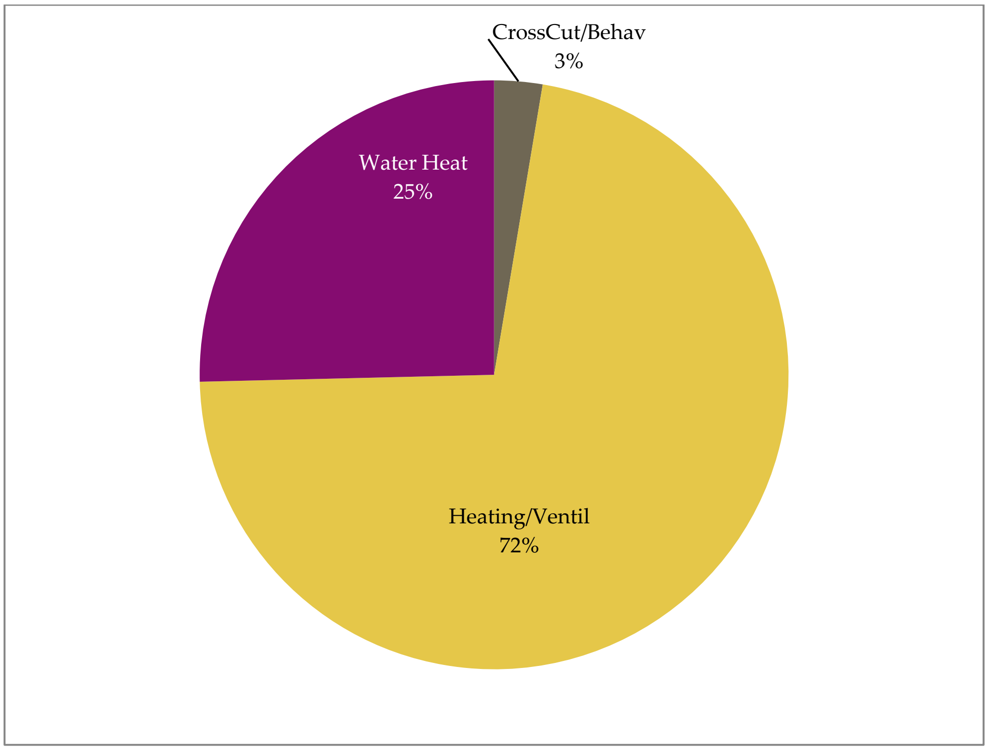
Technical potential is broken out by low income end use in Figure 3-8 and Table 3-9. The low income sector breakdown is similar to the residential sector breakdown due to similar measure applicability, except that there are no measures in the appliance/other end use category.

Figure 3-8. Gas Savings Technical Potential by Low Income End Use in 2024



Source: Navigant analysis, 2014

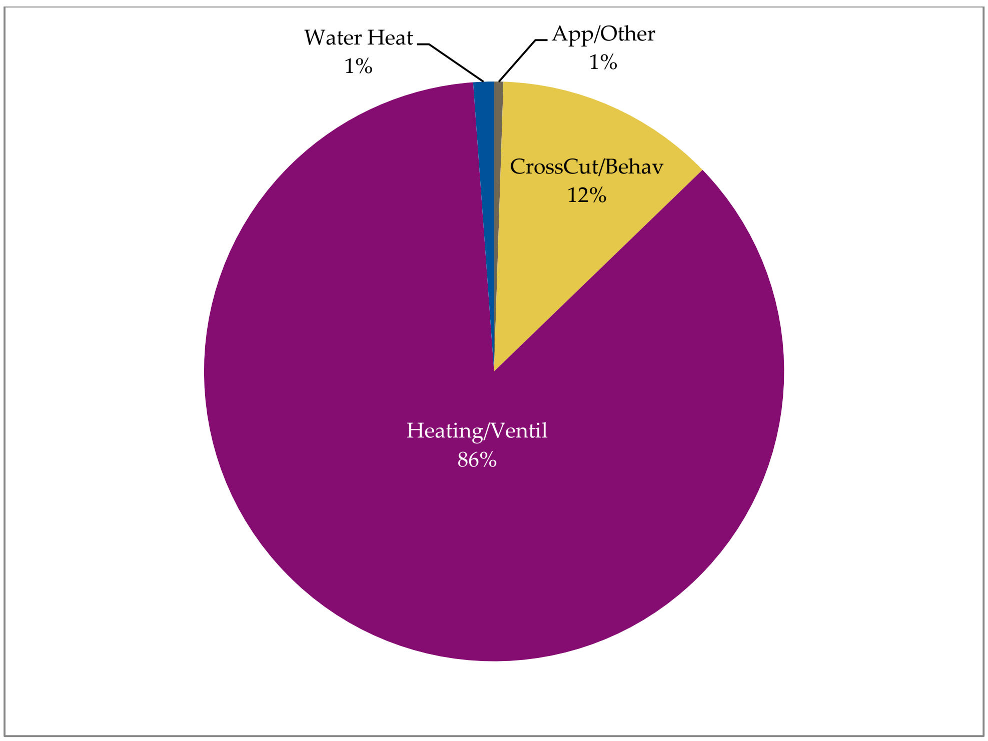
Table 3-9. Gas Savings Technical Potential by Low Income End Use (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
CrossCut/Behav	6	6	6	6	6	6	7	7	7	7
Heating/Ventil	183	183	183	184	184	184	184	185	185	185
Water Heat	57	58	59	60	61	62	63	63	64	65
Total	246	247	248	250	251	252	254	255	256	258

Source: Navigant analysis, 2014

Figure 3-8 and Table 3-10 present the gas technical potential summarized by commercial end use category. The "space heating and ventilation" and "cross-cutting and behavioural" end uses are responsible for the vast majority of gas savings potential in the commercial sector. Nine of the top ten highest-impact commercial measures fall in the heating and ventilation end use. The fifth largest gas savings potential comes from operational improvements, which are measures similar to the "Run it Right" program that fall in the "cross-cutting and behavioural" end use category. The highest ranking measure in the water heating end use is ozone laundry, the 15th-ranked measure in the commercial sector. The "appliance and other" end use category is made up of high-efficiency cooking appliances that are applicable to a small fraction of the commercial sector.

Figure 3-9. Gas Savings Technical Potential by Commercial End Use in 2024



Source: Navigant analysis, 2014

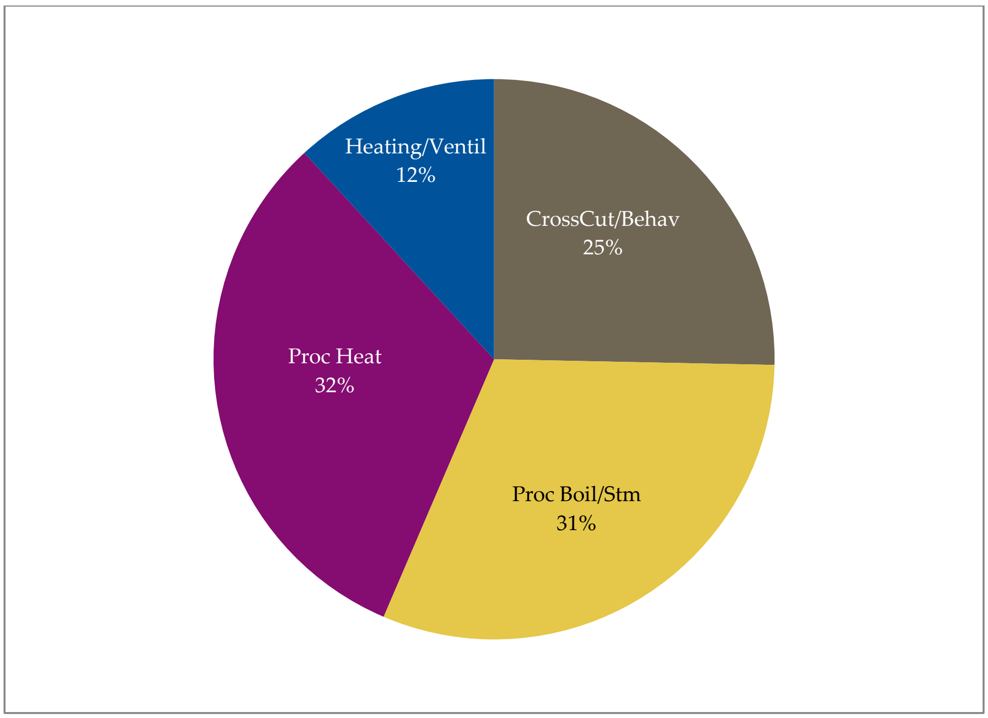
Table 3-10. Gas Savings Technical Potential by Commercial End Use (million m^3/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
App/Other	7	7	7	7	7	7	7	7	7	7
CrossCut/Behav	186	185	184	183	182	181	180	180	179	178
Heating/Ventil	1,156	1,165	1,175	1,184	1,195	1,205	1,216	1,227	1,238	1,250
Water Heat	16	16	16	17	17	17	17	17	17	17
Total	1,365	1,374	1,382	1,391	1,401	1,410	1,420	1,430	1,441	1,452

Source: Navigant analysis, 2014

Technical potential broken out by industrial end use is provided in Figure 3-10 and Table 3-11. Technical potential in the industrial sector is not heavily dominated by the heating and ventilation end use as it is in the other sectors. Instead, "process heat" and "process boilers and steam" contribute heavily. The "cross-cutting and behavioural" end use also plays a significant role, and "heating and ventilation" provides the least amount of industrial potential. The highest-impact industrial measure is energy management and process improvement, which is categorized as a space heating and ventilation measure. Five of the top ten highest ranking measures fall in the process heat end use. The other top ten measures pertain to the process boiler and steam end use. The comparatively small percentage of space heating and ventilation savings potential is consistent with the small percent of total industrial energy consumption for that end use.

Figure 3-10. Gas Savings Technical Potential by Industrial End Use in 2024



Source: Navigant analysis, 2014

Table 3-11. Gas Savings Technical Potential by Industrial End Use (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
CrossCut/Behav	178	180	182	184	186	188	191	193	196	198
Proc Boil/Stm	220	223	225	228	230	233	235	238	241	244
Proc Heat	228	230	231	234	236	238	240	243	246	249
Heating/Ventil	78	79	81	82	84	85	87	89	91	93
Total	704	711	719	727	736	745	754	763	773	784

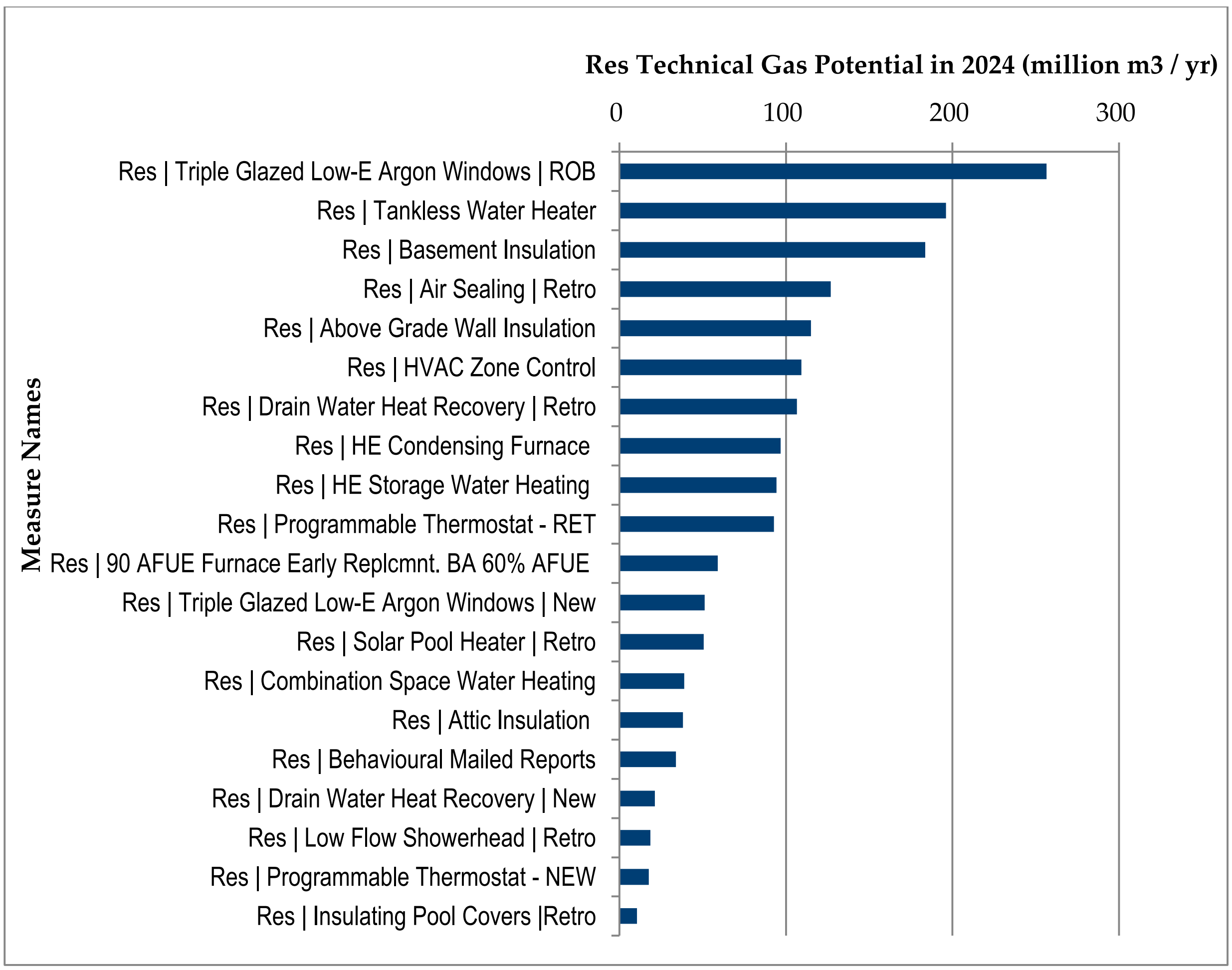
Source: Navigant analysis, 2014

3.2.4 Results by Measure

The measure-level gas savings potential shown in this section are prior to adjustments made to competition groups. Some of these measures are not included in the customer segment, end use, sector and portfolio totals because they are not the measures with the greatest savings potential for their respective competition group.

Figure 3-11 shows the top ranking residential measures along with their gas technical potential. The triple-glazed, low-E, argon windows achieved the greatest technical potential. That measure is applicable to both new construction and replace-on-burnout equipment in all residential customer segments. Triple-glazed, low-E, argon windows account for about 16 percent of the residential savings. Tankless water heaters, the second-ranked measure, account for over 12 percent of the residential savings. The third-ranked measure, basement insulation, accounts for slightly less than 12 percent of residential potential and is a retrofit measure applicable to all residential customer segments.

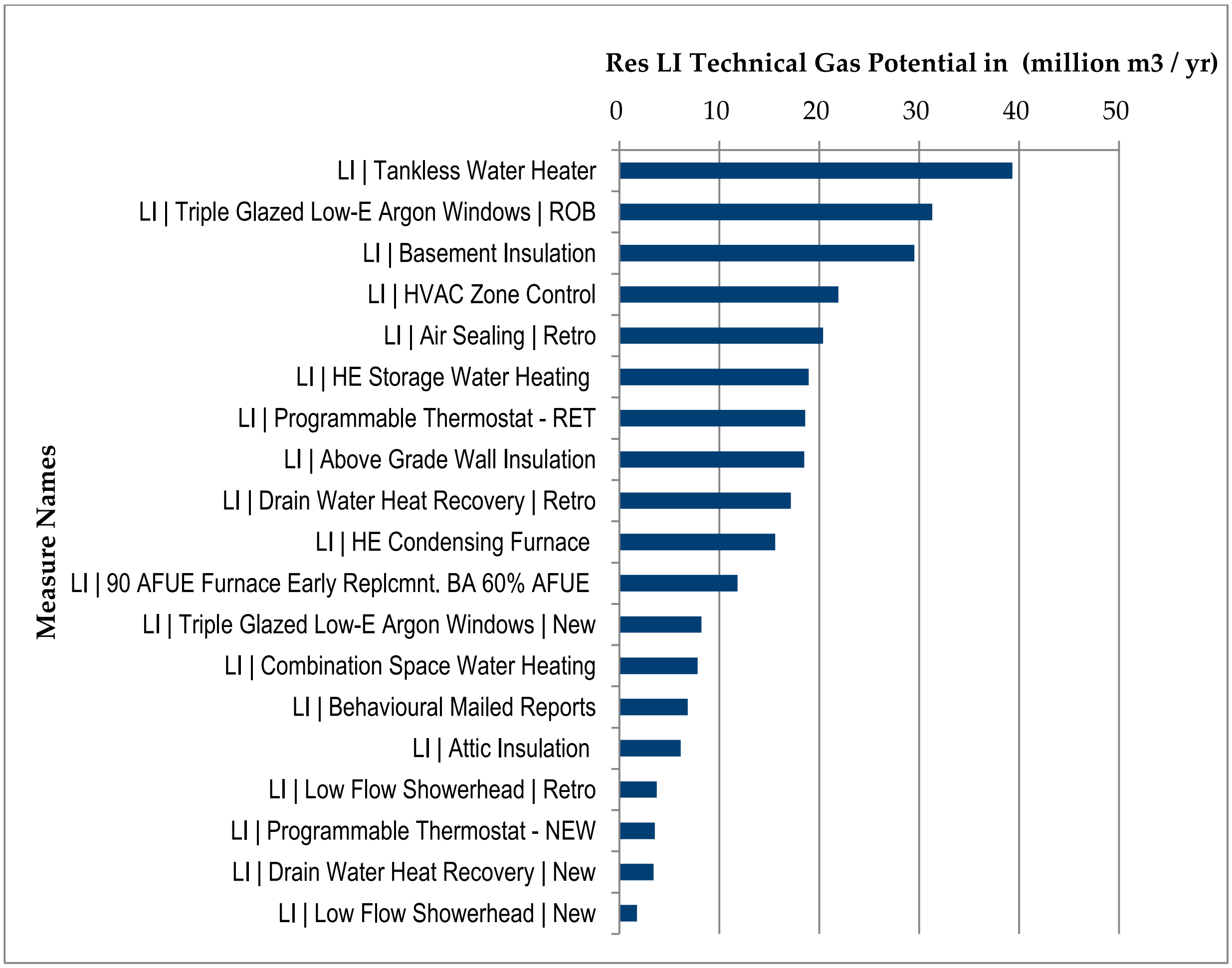
Figure 3-11. Top Residential Measures for Gas Savings Technical Potential (million m³/year)



Source: Navigant analysis, 2014

The low income sector shares similar measures as the residential sector, and has a similar distribution of measure-level results (though the ranking of some of the highest-impact measures has shifted slightly). The low income technical potential accounts for 14 percent of the potential from the low income and residential sectors combined, which aligns with a similar distribution of sales. Figure 3-12 gives the rankings and technical potential for the highest-impact low income measures.

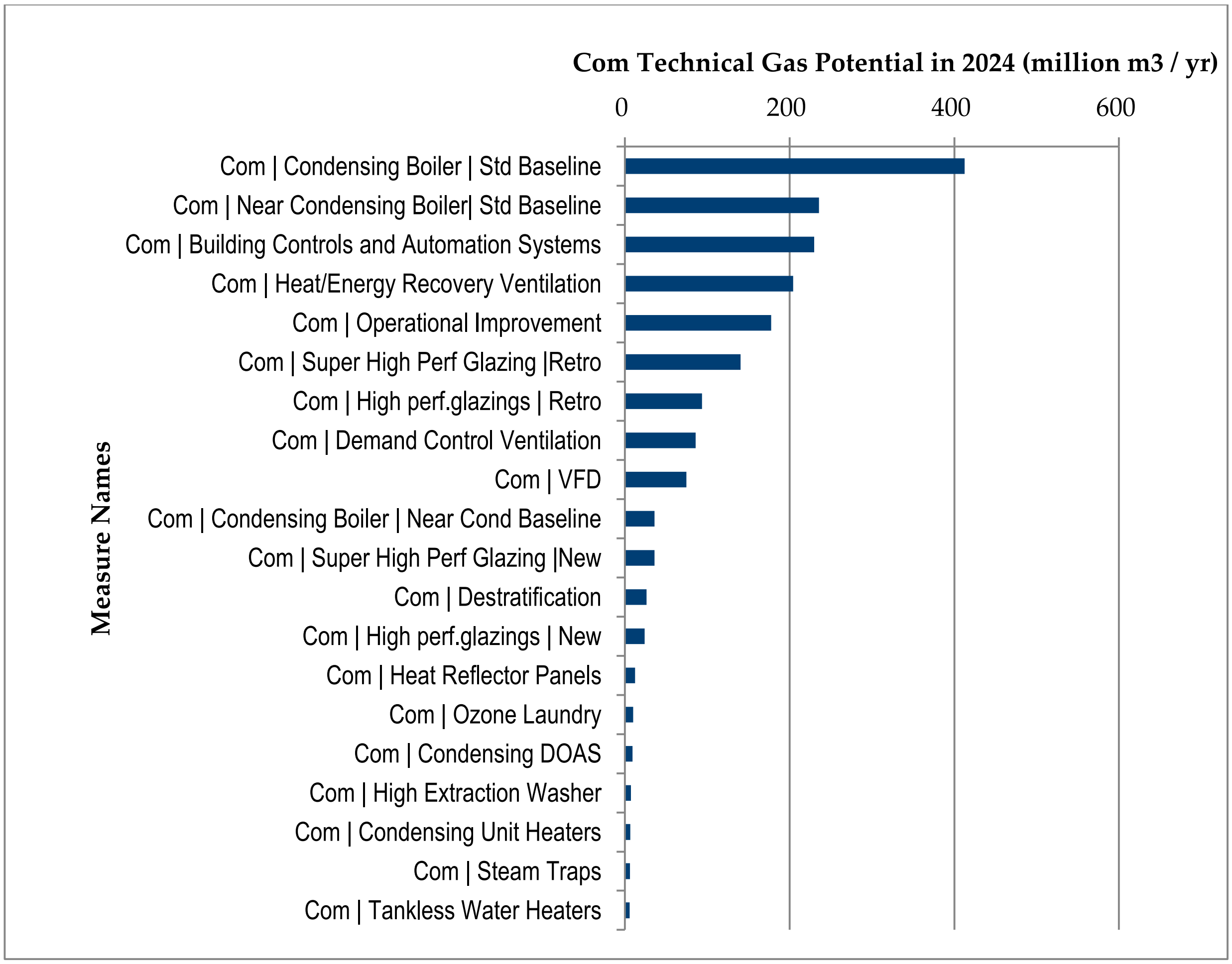
Figure 3-12. Top Low Income Measures for Gas Savings Technical Potential (million m³/year)



Source: Navigant analysis, 2014

Figure 3-13 shows the top commercial measures ranked in order of their technical potential. Nine of the top ten commercial measures fall in the heating and ventilation end use category. Of the top five measures, all but the heat/energy recovery ventilation are applicable to all customer segments, which is a key factor in their total savings potential. Condensing boilers can be used as a replace-on-burnout or a new construction measure and account for about 28 percent of the commercial technical potential. The second-ranked measure, high-efficiency near-condensing boilers, is in a competition group with condensing boilers, and therefore does not contribute to total technical potential. Building controls and automation systems is a space heating and ventilation measure that provides 16 percent of the commercial technical potential.

Figure 3-13. Top Commercial Measures for Gas Savings Technical Potential (million m³/year)



Source: Navigant analysis, 2014

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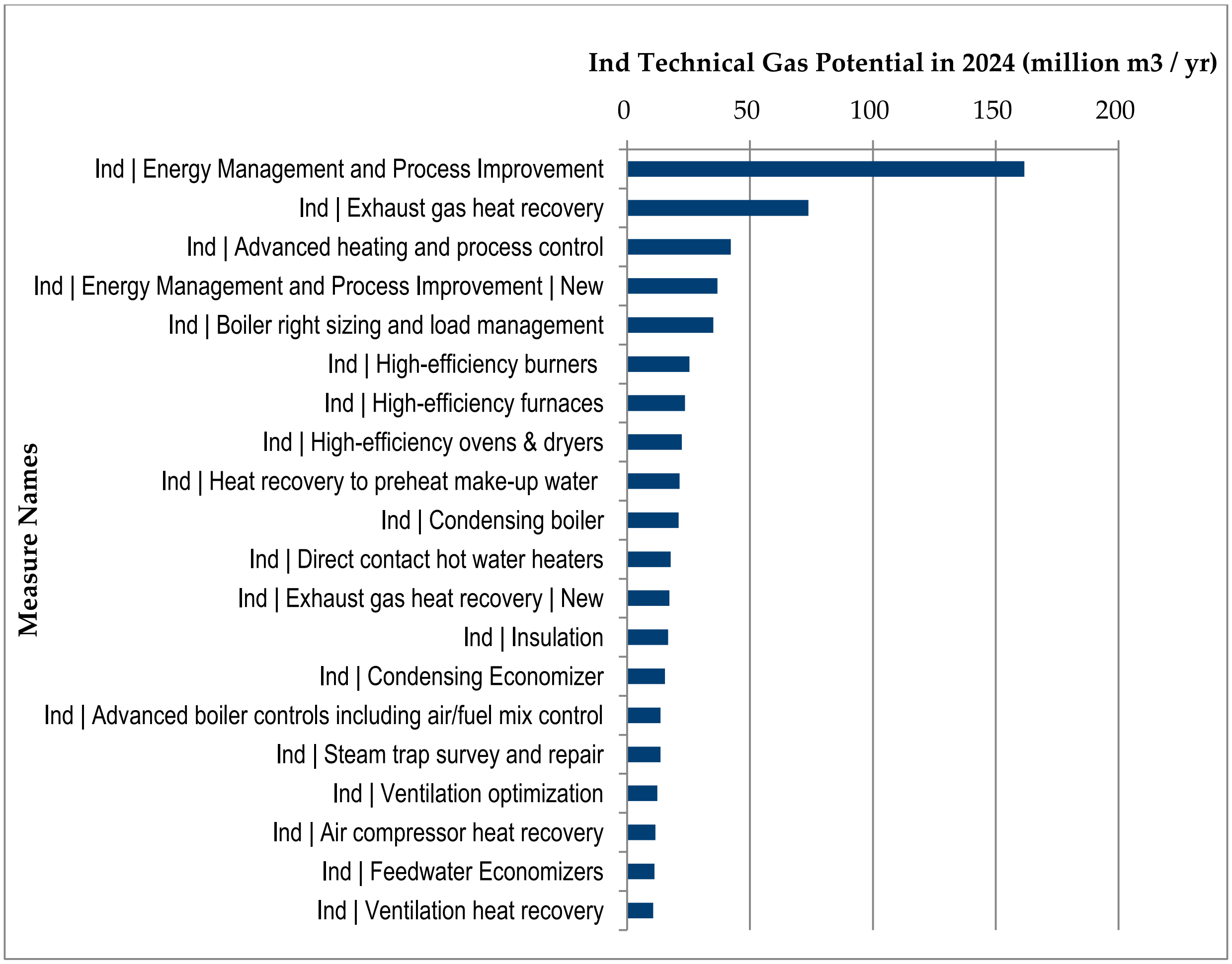
The greatest savings in the industrial sector come from energy management and process improvement, a retrofit cross-cutting and behavioural measure, to which 25 percent of the industrial savings can be attributed. The industrial measures with the highest savings potential are given in Figure 3-14. The next two highest ranked measures are both related to process heat and are retrofit measures. Exhaust gas heat recovery provides 12 percent of the industrial technical potential, and advanced heating and process control provides 7 percent. Each of these top three measures is applicable to all industrial customer segments.

Figure 3-14. Top Industrial Measures for Gas Savings Technical Potential (million m³/year)



Source: Navigant analysis, 2014

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4 Economic Potential Forecast

This section describes the economic gas savings potential, which is potential that meets a prescribed level of cost effectiveness, available in Enbridge's service territories. The section begins by explaining Navigant's approach to calculating economic potential. It then presents the baseline results for economic potential, followed by showing the sensitivity of economic potential to several levels of avoided carbon dioxide (CO_2) costs, in addition to separate sensitivity analyses on avoided distribution costs and non-energy benefits.

4.1 Approach to Estimating Economic Potential

Economic potential is a subset of technical potential, using the same assumptions regarding immediate replacement as in technical potential, but including only those measures that have passed the benefit-cost test chosen for measure screening (in this case the Total Resource Cost (TRC) test, per Enbridge's guidance). The TRC ratio for each measure is calculated each year and compared against the measure-level TRC ratio screening threshold of 0.7 in the low income sector (consistent with OEB DSM Guidelines) and 1.0 in all other sectors. A measure with a TRC ratio greater than or equal to 1.0 is a measure that provides monetary benefits greater than or equal to its costs. If a measure's TRC meets or exceeds the threshold, it is included in the economic potential.

The TRC test is a cost-benefit metric that measures the net benefits of energy efficiency measures from the viewpoint of an entire service territory. The TRC benefit-cost ratio is calculated in the model using the following equation:

$$TRC = \frac{PV(Avoided\ Costs + O\&M\ Savings)}{PV(Technology\ Cost + Admin\ Costs)}$$

where:

PV( ) is the present value calculation that discounts cost streams over time.

Avoided Costs are the net monetary benefits resulting from gas, electric and water savings (e.g., avoided costs of infrastructure investments, as well as avoided commodity costs due to energy and water conserved by efficient measures).

Technology Cost is the net incremental equipment cost to the customer.

O&M Savings are the net non-energy benefits such as operation and maintenance cost savings.

Admin Costs are the gross administrative costs incurred by the utility or program administrator.

Navigant calculated TRC ratios for each measure based on the present value of benefits and costs (as defined above) over each measure's life. Avoided costs, discount rates, and other key data inputs used in the TRC calculation are presented in Appendix B, while measure-specific inputs are provided in Appendix C. As agreed upon with Enbridge, effects of free ridership are not present in the results from this study, so a net-to-gross (NTG) factor (100 percent minus the free ridership rate) of 100 percent was applied. Gross savings, rather than net, are included in this report for a number of reasons. First, there was a desire that the results of this report be compatible with different NTG assumptions in the future, permitting separate calculation of net results as NTG assumptions are updated. Second, there was a desire to be able to easily compare the results of this study with the prior potential study conducted by Marbek, which also reported only gross savings. Third, NTG assumptions can change with different assumptions regarding the program design, which is a scope that is outside of this study. Enbridge plans to calculate net savings separately, post study completion.

Although the TRC equation includes administrative costs, these costs are not considered during the economic screening process at the *measure*-level, because we are concerned with an individual measure's cost effectiveness "on the margin." Rather, administrative costs are only included in economic potential calculations when aggregating multiple measures into a program or portfolio. Administrative costs will be included in the TRC calculations used to determine achievable potential. Navigant's approach is consistent with the methodology described in the *California Standard Practice Manual*.[17]

Similar to technical potential, only one "economic" measure (meaning that its TRC meets the threshold) from each competition group is included in the summation of economic potential across measures (e.g., at the end use, customer segment, sector, service territory or total level). If a competition group is composed of more than one measure that passes the TRC test, then the economic measure that provides the greatest gas savings potential is included in the summation of economic potential. This approach ensures that double-counting is not present in the reported economic potential, though economic potential for each individual measure is still calculated and reported.

4.2 *Economic Potential Results*

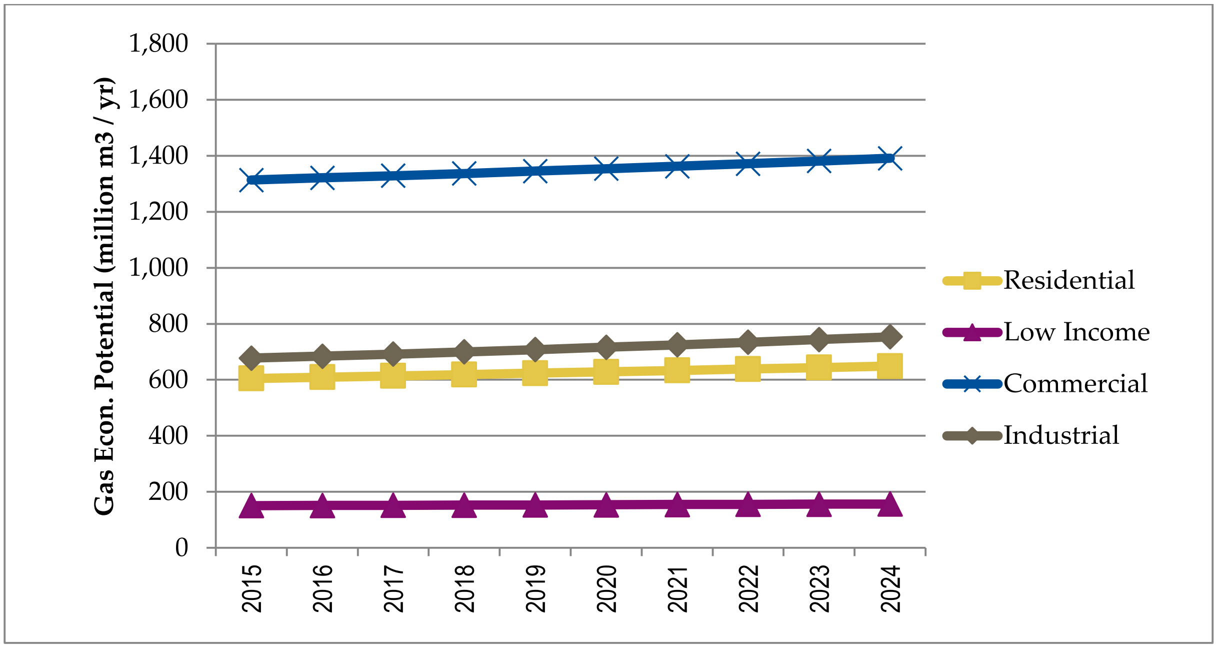
This sub-section provides DSMSim results pertaining to natural gas total economic potential at different levels of aggregation. Results are shown by sector, customer segment, end use and by highest-impact measures.

4.2.1 Results by Sector

Figure 4-1 and Table 4-1 show the economic potential by sector and highlight that the commercial sector provides the most economic potential. The residential and low income sectors experienced a 59 percent and 39 percent decrease from technical to economic potential, respectively. The decrease in the low income sector is smaller than the decrease in the residential sector because of the 0.7 TRC threshold used in the low income sector. Smaller changes occurred in the commercial and industrial sectors, where the reduction between economic and technical potential was 4 percent. All sectors experience positive growth in economic potential over time. Notably, the industrial and residential sectors grew by 11 percent and 7 percent, respectively, over the ten-year horizon.

[17] See *California Standard Practice Manual, Economic Analysis of Demand-Side Programs and Projects*. October, 2001, available at http://www.energy.ca.gov/greenbuilding/documents/background/07-J_CPUC_STANDARD_PRACTICE_MANUAL.PDF

Figure 4-1. Gas Savings Economic Potential by Sector (million m³/year)



Source: Navigant analysis, 2014

Table 4-1. Gas Savings Economic Potential by Sector (million m³/year)

Year	Residential	Low Income	Commercial	Industrial	Total
2015	605	151	1,313	677	2,746
2016	609	151	1,321	684	2,766
2017	614	152	1,329	692	2,787
2018	619	153	1,337	700	2,808
2019	624	153	1,345	708	2,830
2020	628	154	1,354	716	2,852
2021	633	155	1,363	725	2,876
2022	638	155	1,372	734	2,900
2023	643	156	1,381	744	2,924
2024	649	157	1,391	754	2,950

Source: Navigant analysis, 2014

Figure 4-2 and Table 4-2 provide the economic gas potential as a percentage of sector sales. Economic potential as a percentage of sector sales stays nearly flat for all sectors except the commercial sector. The commercial sector declines by 9 percent over the study horizon. Again, this is due to the changing mix of the new building stock versus existing stock.

Figure 4-2. Gas Savings Economic Potential as a Percentage of Sector Sales

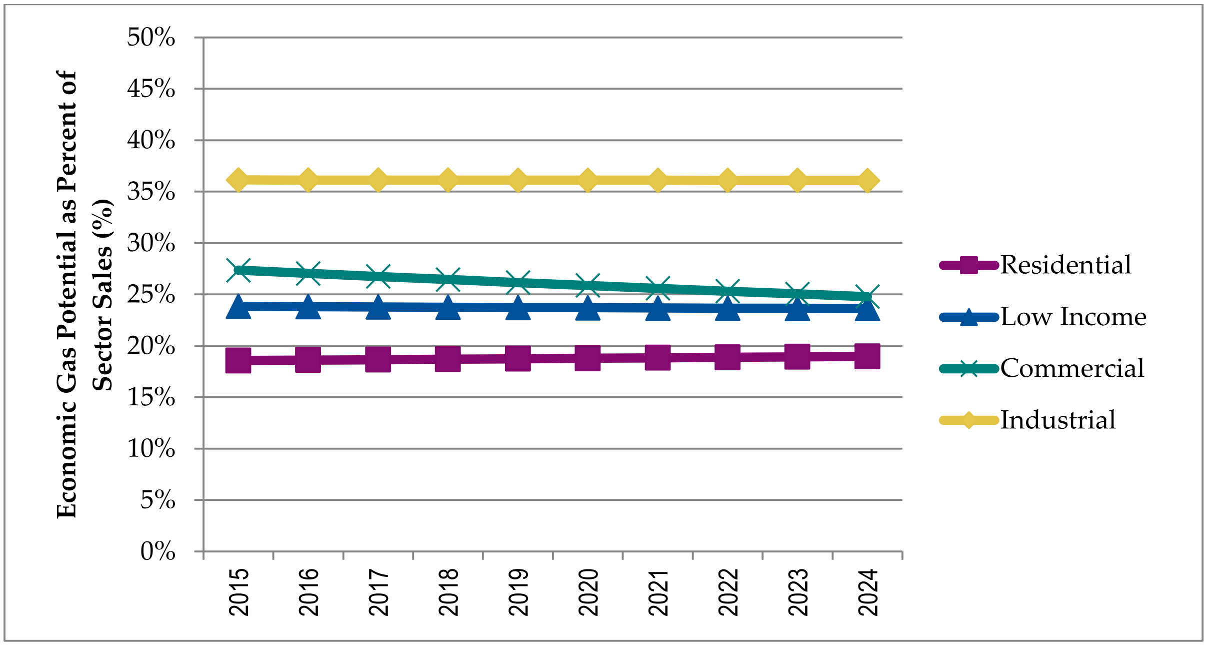


Table 4-2. Gas Savings Economic Potential as a Percentage of Sector Sales

Year	Residential	Low Income	Commercial	Industrial	Total
2015	19%	24%	27%	36%	26%
2016	19%	24%	27%	36%	26%
2017	19%	24%	27%	36%	26%
2018	19%	24%	26%	36%	26%
2019	19%	24%	26%	36%	26%
2020	19%	24%	26%	36%	25%
2021	19%	24%	26%	36%	25%
2022	19%	24%	25%	36%	25%
2023	19%	24%	25%	36%	25%
2024	19%	24%	25%	36%	25%

Source: Navigant analysis, 2014

The economic gas savings potential from new construction only (as compared with the combination of new construction and existing buildings shown above) is provided in Figure 4-3 and Table 4-3. The

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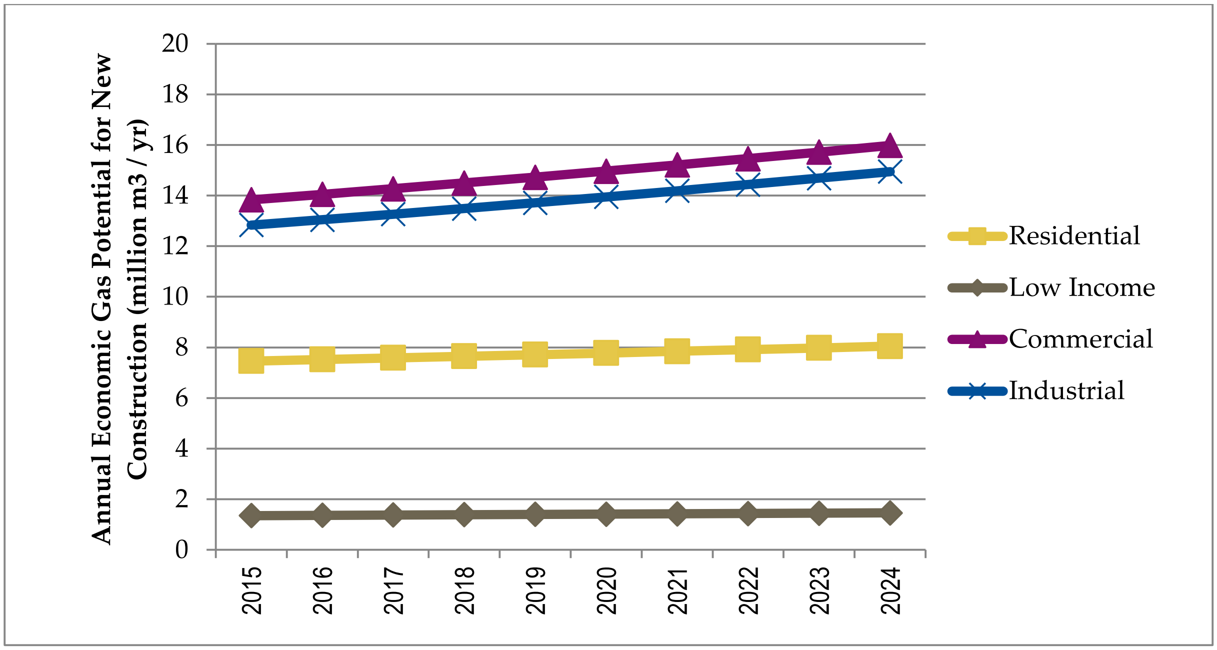
majority of new construction economic potential comes from the commercial and industrial sectors. Total economic potential in 2024 from new construction declined 19 percent relative to the technical potential. Residential new construction economic potential declined 44 percent; low income declined 43 percent; commercial fell by 8 percent, and the industrial sector was reduced by 4 percent.

Figure 4-3. Gas Savings Annual Economic Potential by Sector for New Construction (million m³/year)



Source: Navigant analysis, 2014

Table 4-3. Gas Savings Annual Economic Potential by Sector for New Construction (million m³/year)

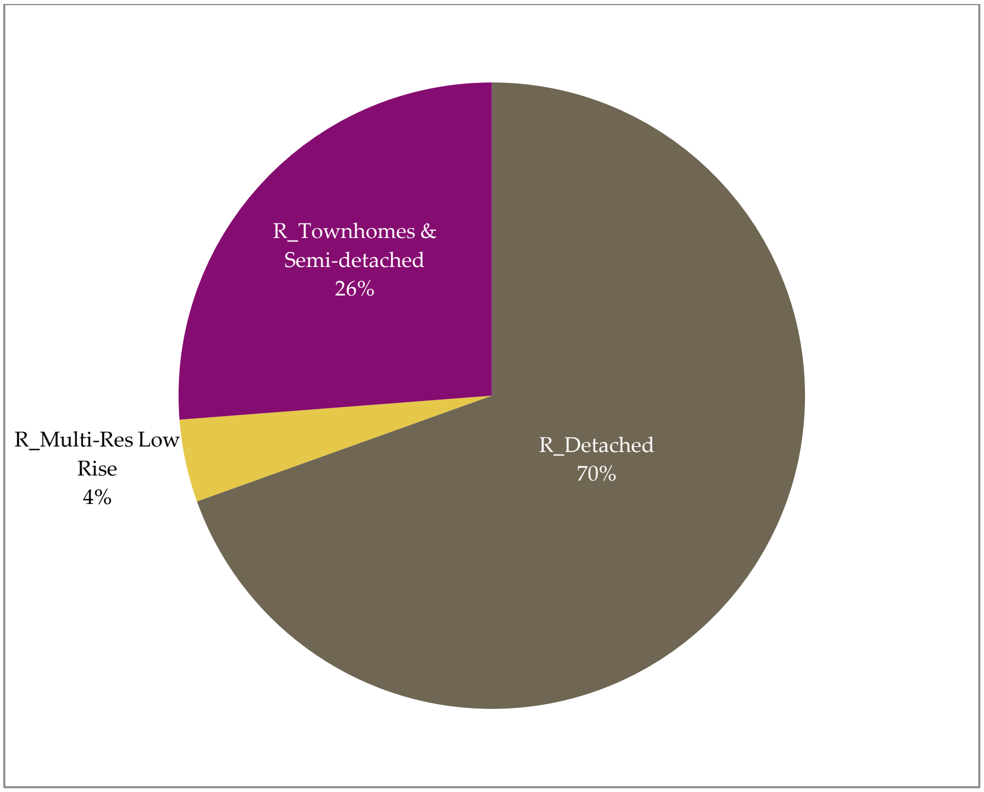
Year	Residential	Low Income	Commercial	Industrial	Total
2015	7	1	14	13	35
2016	8	1	14	13	36
2017	8	1	14	13	36
2018	8	1	14	13	37
2019	8	1	15	14	38
2020	8	1	15	14	38
2021	8	1	15	14	39
2022	8	1	15	14	39
2023	8	1	16	15	40
2024	8	1	16	15	40
Total	78	14	149	139	379

Source: Navigant analysis, 2014

4.2.2 Results by Customer Segment

The gas economic potential shown in Figure 4-4 and Table 4-4 is broken out by residential customer segment. The reductions in economic potential relative to technical potential range from 59 to 60 percent for the residential customer segments.

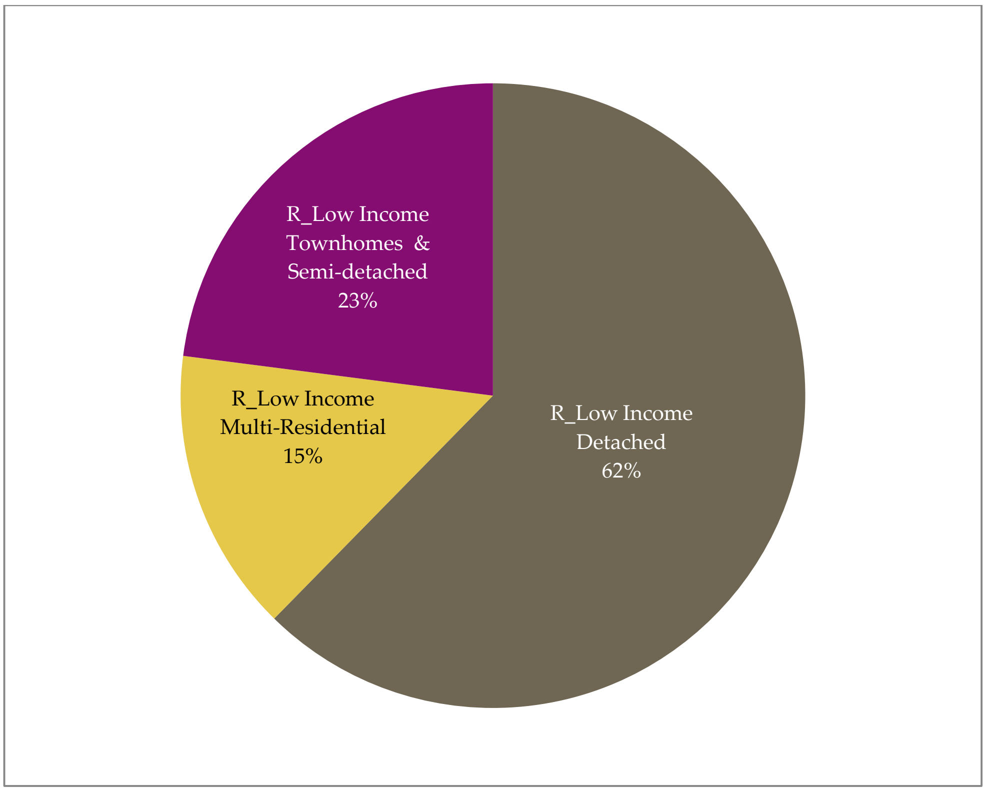
Figure 4-4. Gas Savings Economic Potential by Residential Customer Segment in 2024



Source: Navigant analysis, 2014

The gas economic potential shown in Figure 4-5 and Table 4-5 is broken out by low income customer segments. Gas potential from the low income sector follows a similar distribution to the residential sector with slightly more economic potential coming from the multi-residential customer segment. The reductions in economic potential relative to technical potential range from 29 to 43 percent for the low income customer segments. The multi-residential customer segment fell on the low end of that range, while the other low income customer segments landed on the higher end.

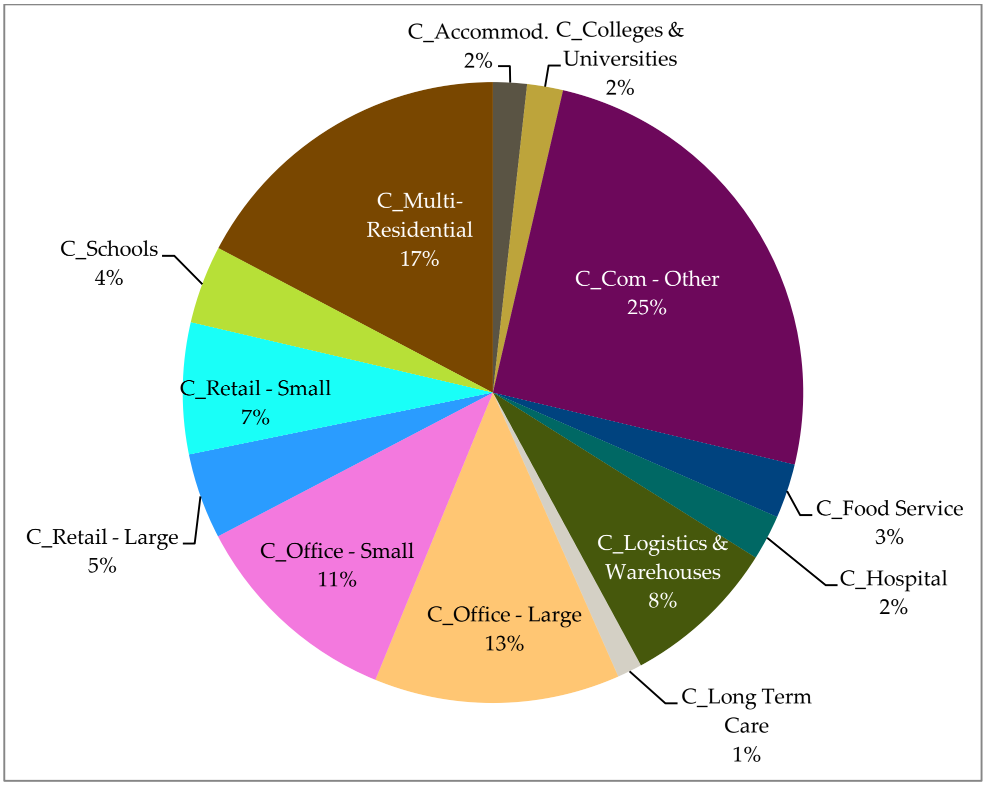
Figure 4-5. Gas Savings Economic Potential by Low Income Customer Segment in 2024



Source: Navigant analysis, 2014

The gas economic potential shown in Figure 4-6 and Table 4-6 is summarized by commercial customer segment. Gas economic potential decreased between 3 to 5 percent relative to the technical potential, depending on the customer segment.

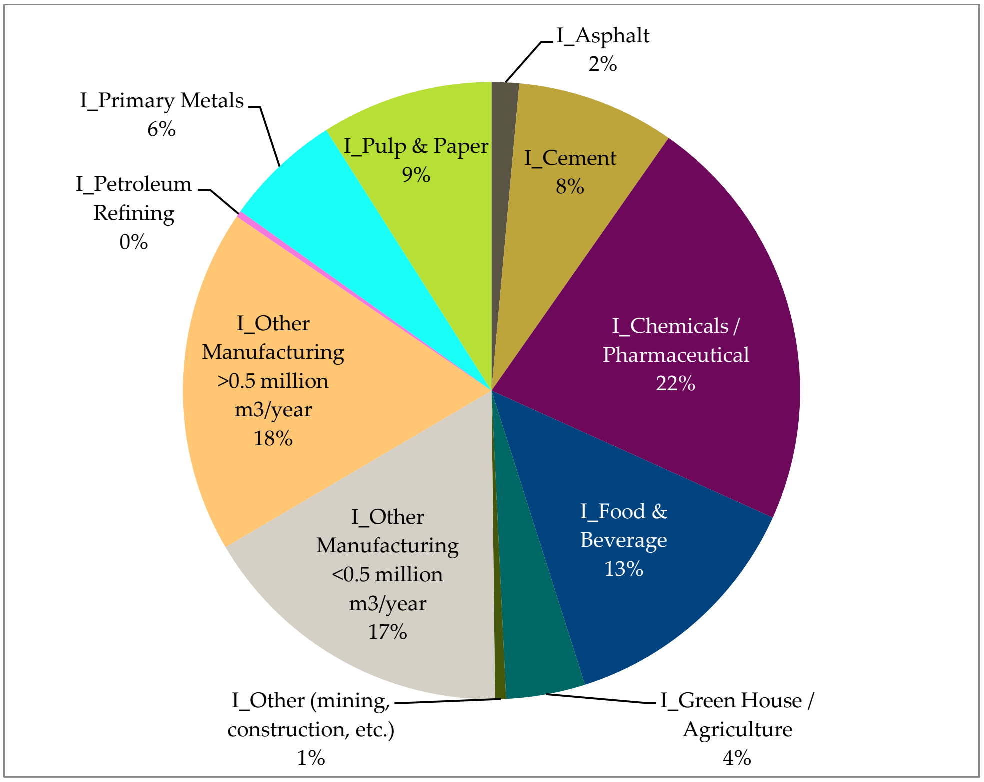
Figure 4-6. Gas Savings Economic Potential by Commercial Customer Segment in 2024



Source: Navigant analysis, 2014

Figure 4-7 and Table 4-7 show the gas economic potential disaggregated by industrial customer segments. There are very few differences between the economic and technical potential for the industrial sector because most of the high-impact measures are economic. Depending on the industrial customer segment, economic potential is 0 to 5 percent smaller than the technical potential. The three most resilient customer segments, in order of least change, are petroleum refining, other industrial (mining, construction, etc.) and primary metals. The three most heavily impacted segments, in order of greatest change, are "greenhouse and agriculture", "pulp and paper" and "food and beverage."

Figure 4-7. Gas Savings Economic Potential by Industrial Customer Segment in 2024



Source: Navigant analysis, 2014

Table 4-4. Gas Savings Economic Potential by Residential Customer Segment (million m^3/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
R_Detached	413	417	421	425	429	433	438	442	446	451
R_Multi-Residential Low Rise	24	24	25	25	26	26	26	27	27	28
R_Townhomes & Semi-detached	168	168	169	169	169	169	169	170	170	170
Totals	605	609	614	619	624	628	633	638	643	649

Source: Navigant analysis, 2014

Table 4-5. Gas Savings Economic Potential by Low Income Customer Segment in (million m^3/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
R_Low Income Detached	93	93	94	94	95	95	96	97	97	98
R_Low Income Multi-Residential	22	22	22	22	22	22	23	23	23	23
R_Low IncomeTownhomes & Semi-detached	36	36	36	36	36	36	36	36	36	36
Totals	151	151	152	153	153	154	155	155	156	157

Source: Navigant analysis, 2014

Table 4-6. Gas Savings Economic Potential by Commercial Customer Segment in (million m^3/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
C_Accommodation	24	24	24	24	24	24	24	24	24	24
C_Colleges & Universities	22	22	23	23	24	24	24	25	25	26
C_Com - Other	307	311	315	319	324	329	334	339	344	349
C_Food Service	38	38	38	39	39	39	39	39	39	39
C_Hospital	33	33	33	33	33	33	33	33	33	33
C_Logistics & Warehouses	111	111	111	112	112	112	113	113	113	114
C_Long Term Care	18	18	18	18	18	18	18	18	18	18
C_Office - Large	173	174	174	175	175	176	176	177	177	178
C_Office - Small	149	149	150	151	151	152	153	154	154	155
C_Retail - Large	57	58	58	59	59	60	60	61	61	62
C_Retail - Small	89	90	90	91	92	92	93	94	94	95
C_Schools	52	53	53	54	54	55	55	56	56	57
C_Multi-Residential	241	241	241	241	241	241	241	241	240	240
Totals	1,313	1,321	1,329	1,337	1,345	1,354	1,363	1,372	1,381	1,391

Source: Navigant analysis, 2014

Table 4-7. Gas Savings Economic Potential by Industrial Customer Segment in (million m^3/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
I_Asphalt	9	9	9	10	10	10	10	10	11	11
I_Cement	45	47	48	50	52	54	56	58	60	62
I_Chemicals / Pharmaceutical	150	152	154	155	157	159	161	162	164	166
I_Food & Beverage	83	85	87	89	91	93	95	97	99	101
I_Green House / Agriculture	26	26	27	28	28	29	29	30	31	31
I_Other (including mining, construction, etc.)	4	4	4	4	4	4	4	4	4	4
I_Other Manufacturing <0.5 million m3/year	104	107	109	111	114	116	118	121	123	126
I_Other Manufacturing >0.5 million m3/year	113	115	117	120	122	125	127	130	133	136
I_Petroleum Refining	3	3	3	3	3	3	3	3	3	3
I_Primary Metals	63	61	59	57	55	53	51	49	48	46
I_Pulp & Paper	77	76	75	74	73	72	71	70	69	68
Totals	677	684	692	700	708	716	725	734	744	754

Source: Navigant analysis, 2014

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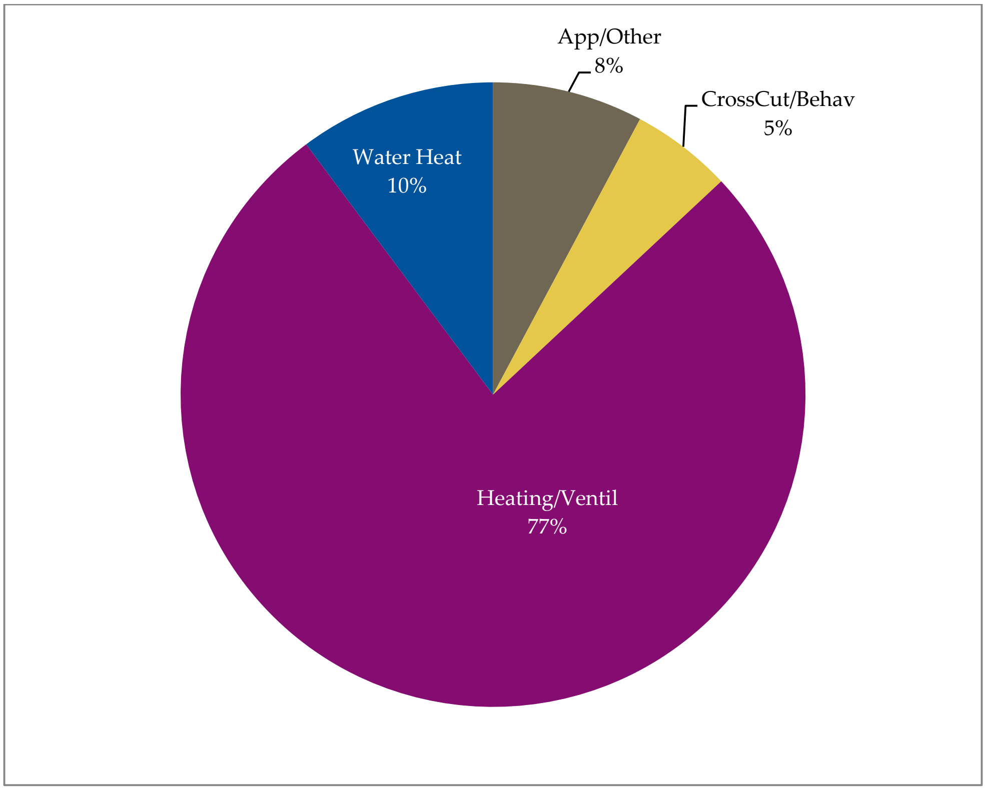
4.2.3 Results by End Use

The gas economic potential broken out by residential end use is provided in Figure 4-8 and Table 4-8. Relative to the technical potential, economic potential for water heating declined by 81 percent; heating and ventilation decreased by 57 percent; and appliances and other fell by 20 percent. The "cross-cutting and behavioural" end use is equivalent between economic and technical potential.

Figure 4-8. Gas Savings Economic Potential by Residential End Use in 2024



Source: Navigant analysis, 2014

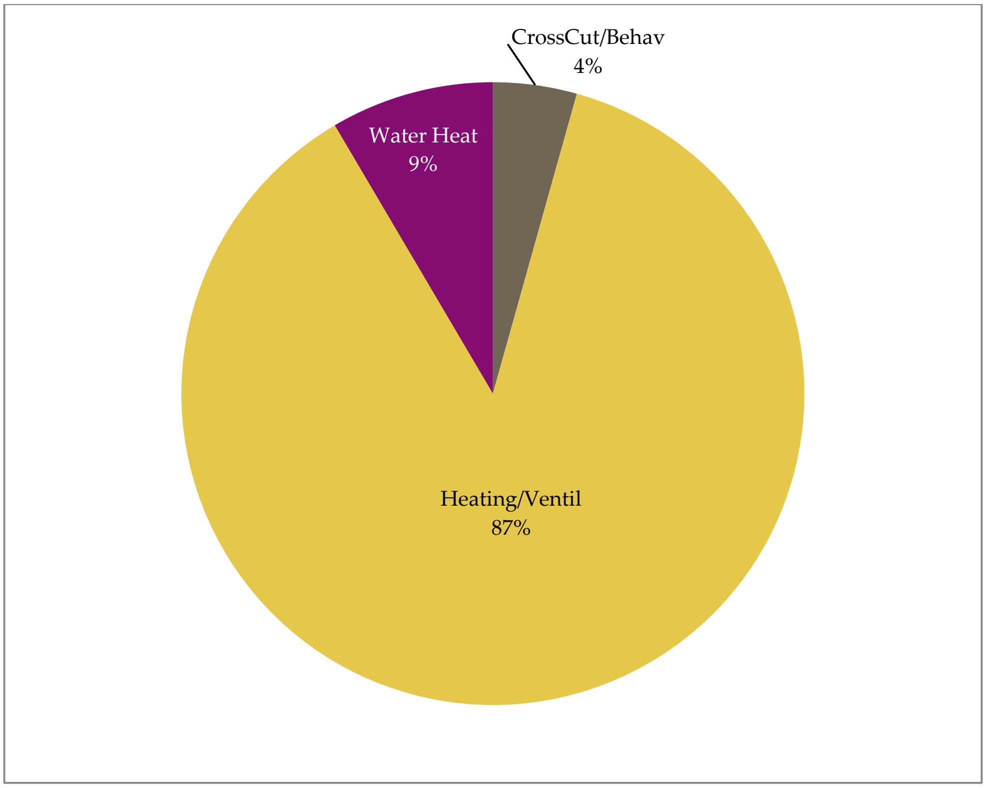
Table 4-8. Gas Savings Economic Potential by Residential End Use (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
App/Other	53	53	52	52	52	52	51	51	51	51
CrossCut/Behav	30	31	31	31	32	32	33	33	34	34
Heating/Ventil	467	470	474	477	480	484	487	491	494	498
Water Heat	55	56	57	58	60	61	62	64	65	66
Total	605	609	614	619	624	628	633	638	643	649

Source: Navigant analysis, 2014

The gas economic potential broken out by low income end use is provided in Figure 4-9 and Table 4-9. The percent reductions in economic potential relative to technical potential for the low income sector are 80 percent for "water heating", 26 percent for "heating and ventilation" and 0 percent for "cross-cutting and behavioural."

Figure 4-9. Gas Savings Economic Potential by Low Income End Use in 2024



Source: Navigant analysis, 2014

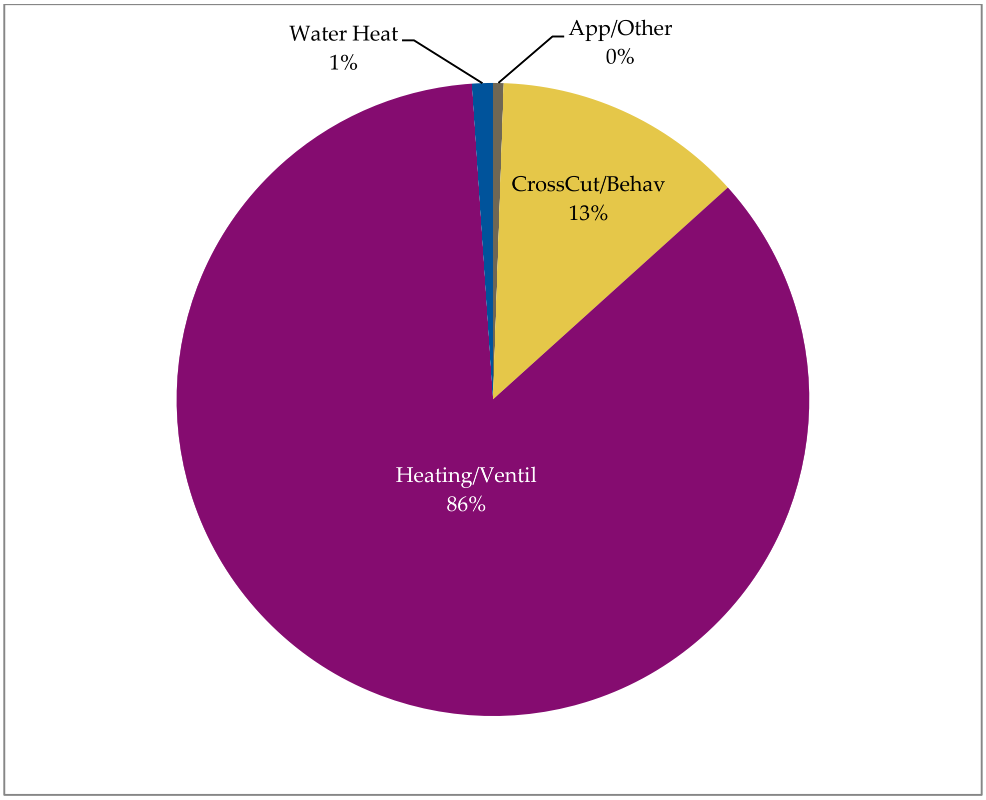
Table 4-9. Gas Savings Economic Potential by Low Income End Use (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
CrossCut/Behav	6	6	6	6	6	6	7	7	7	7
Heating/Ventil	134	134	134	135	135	135	136	136	136	137
Water Heat	11	11	11	12	12	12	12	13	13	13
Total	151	151	152	153	153	154	155	155	156	157

Source: Navigant analysis, 2014

Figure 4-10 and Table 4-10 present the gas economic potential summarized by commercial end use category. Relative to technical potential, economic potential for "water heating" declined by 12 percent and "heating and ventilation" decreased by 5 percent. The "appliances and other" and "cross-cutting and behavioural" end uses are equivalent between economic and technical potential.

Figure 4-10. Gas Savings Economic Potential by Commercial End Use in 2024



Source: Navigant analysis, 2014

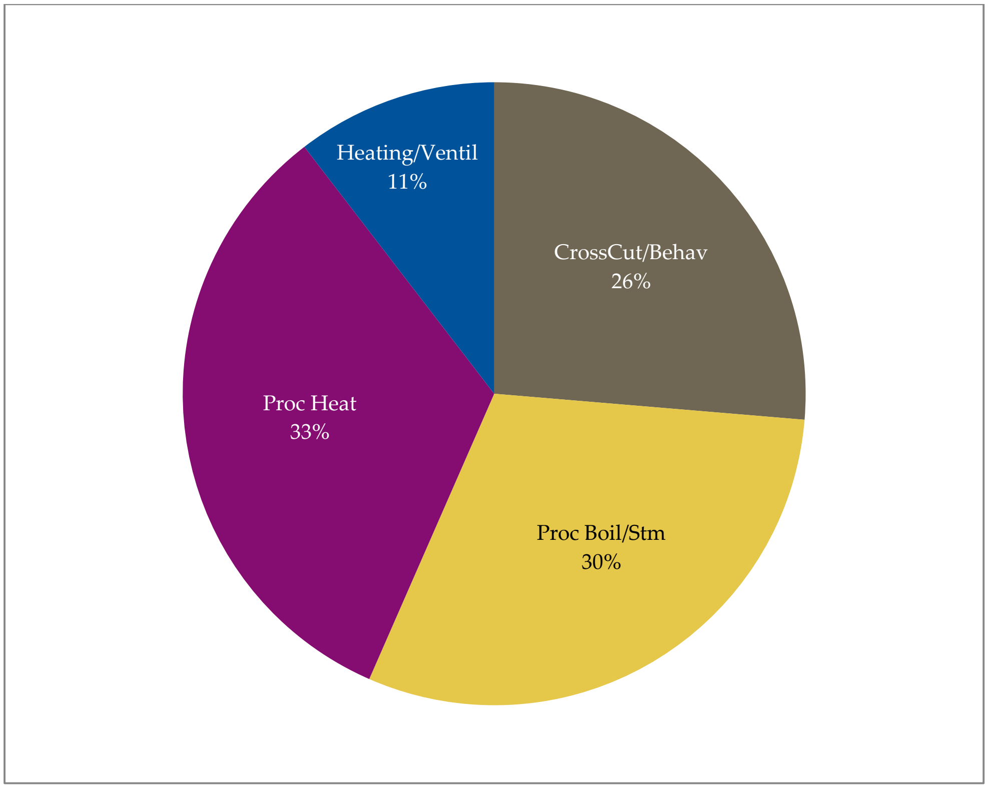
Table 4-10. Gas Savings Economic Potential by Commercial End Use (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
App/Other	7	7	7	7	7	7	7	7	7	7
CrossCut/Behav	186	185	184	183	182	181	180	180	179	178
Heating/Ventil	1,106	1,114	1,123	1,132	1,141	1,150	1,160	1,170	1,180	1,191
Water Heat	15	15	15	15	15	15	15	15	15	15
Total	1,313	1,321	1,329	1,337	1,345	1,354	1,363	1,372	1,381	1,391

Source: Navigant analysis, 2014

The gas economic potential broken out by industrial end use is provided in Figure 4-11 and Table 4-11. Economic potential is identical to technical potential for the "cross-cutting and behavioural" and "process heat" end uses. The economic potential in the "heating and ventilation" end use category declined by 15 percent, while the "process boiler and steam" end use fell by 7 percent.

Figure 4-11. Gas Savings Economic Potential by Industrial End Use in 2024



Source: Navigant analysis, 2014

Table 4-11. Gas Savings Economic Potential by Industrial End Use (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
CrossCut/Behav	178	180	182	184	186	188	191	193	196	198
Proc Boil/Stm	206	208	210	212	215	217	220	222	225	228
Proc Heat	228	230	231	234	236	238	240	243	246	249
Heating/Ventil	66	67	68	70	71	72	74	75	77	79
Total	677	684	692	700	708	716	725	734	744	754

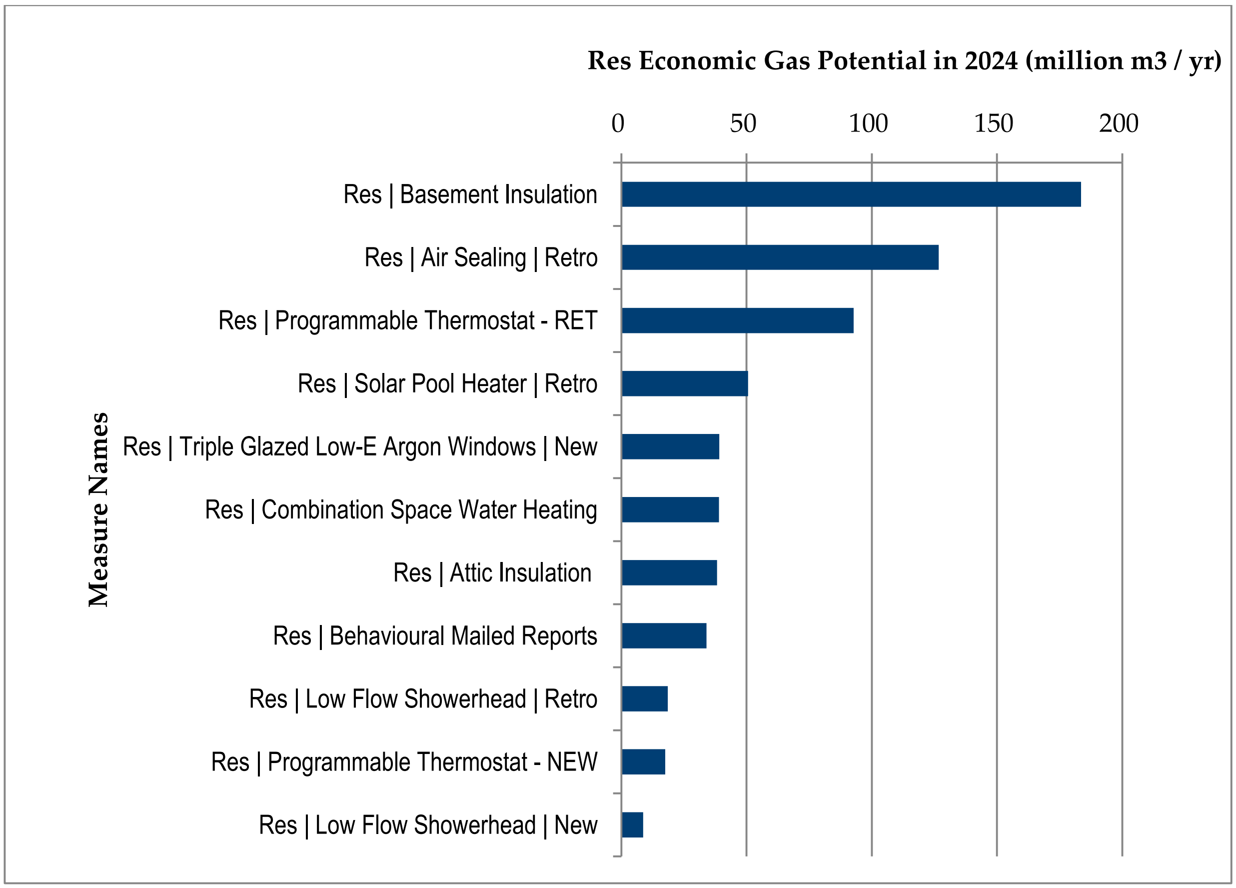
Source: Navigant analysis, 2014

4.2.4 Results by Measure

The measure-level gas savings potential shown in this section are prior to adjustments made to competition groups. Some of these measures are not included in the customer segment, end use, sector and portfolio totals because they are not the measures with the greatest savings potential for their respective competition group.

For the residential sector, 41 percent of the technical potential passed the TRC test and is included in the economic potential.[18] Figure 4-12 shows the top ranking residential measures for gas economic potential. Tankless water heaters, above grade wall insulation and HVAC zone control are three of the largest measures in terms of technical potential that did not pass the TRC test.

Figure 4-12. Top Residential Measures for Gas Savings Economic Potential (million m³/year)



Source: Navigant analysis, 2014

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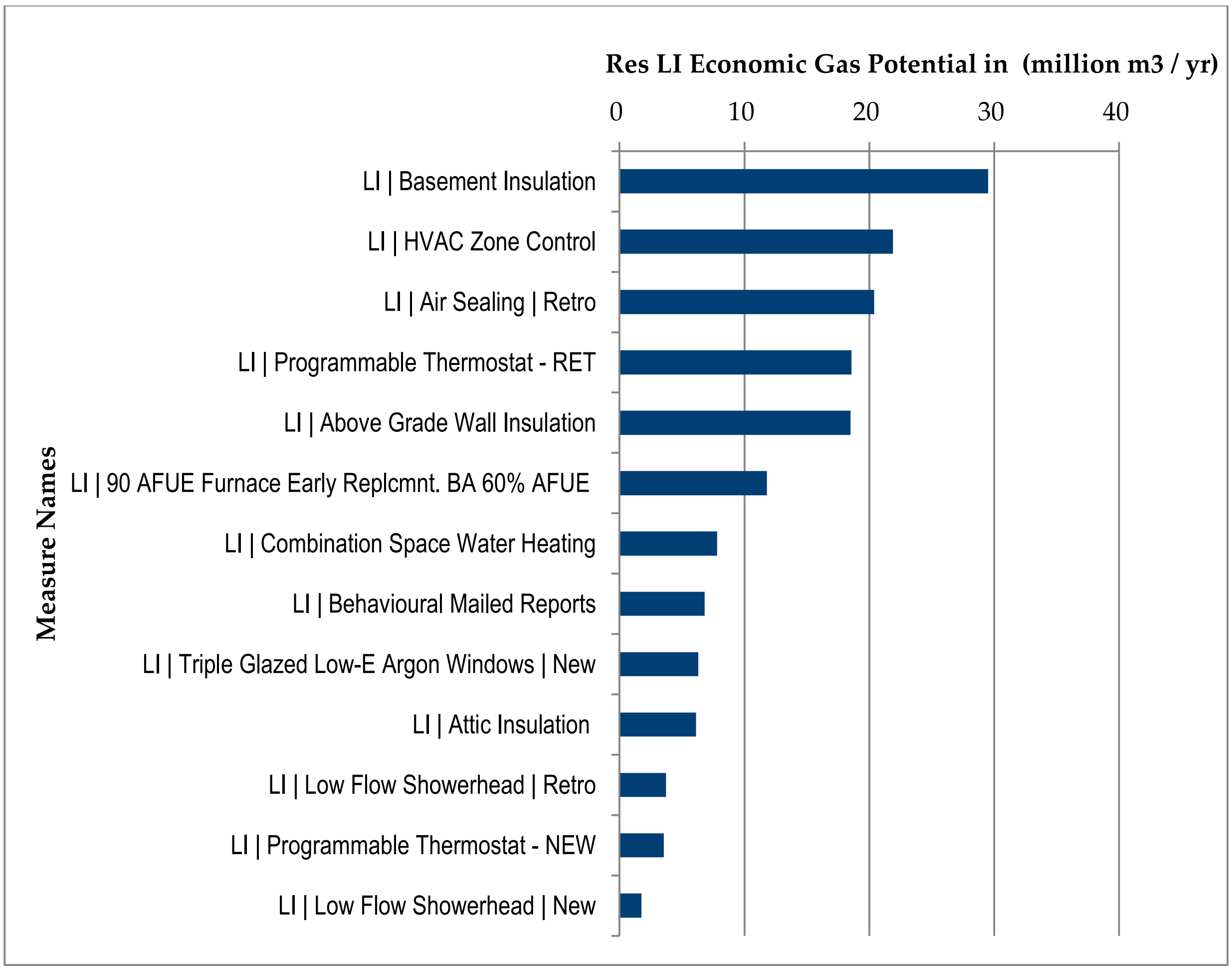
[18] We note that the cost estimate for air sealing (sourced from the OEB approved measure list) is for "do it yourself" (DIY) kit, which Enbridge does not currently have in its portfolio. If a different program delivery mechanism is selected for this measure, the cost assumptions in this study would be optimistic (possibly necessitating bundling with other retrofit measures to ensure cost-effectiveness).

Sixty-one (61) percent of the technical potential is economic in the low income sector. Due to the lower TRC threshold of 0.7 used in the low income sector, HVAC zone control and above grade wall insulation are included in the economic potential (whereas they are not included in the residential economic potential). "Tankless water heaters", "triple-glazed, low-E, argon windows" (in existing buildings) and "high-efficiency storage water heating" are three low income measures that provided significant technical potential but did not pass the TRC test. Figure 4-13 gives the rankings and economic potential for the highest-impact low income measures.

Figure 4-13. Top Low Income Measures for Gas Savings Economic Potential (million m³/year)



Source: Navigant analysis, 2014

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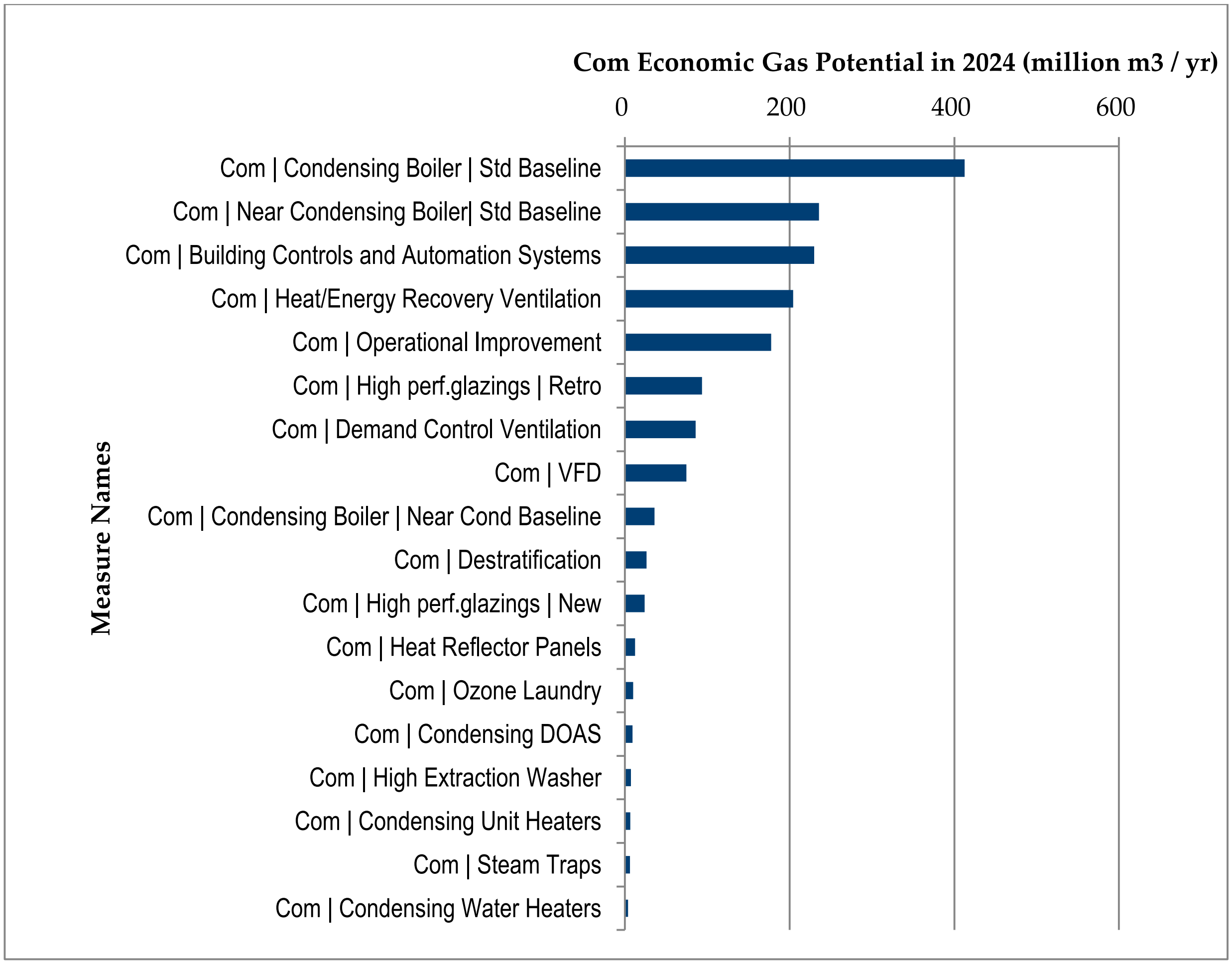
Figure 4-14 shows the top commercial measures ranked in order of their economic potential. In the commercial sector, 96 percent of the technical potential is cost effective. Super high performance glazing was the only measure that ranked in the top ten, in terms of technical potential, that did not pass the TRC test.

Figure 4-14. Top Commercial Measures for Gas Savings Economic Potential (million m³/year)



Source: Navigant analysis, 2014

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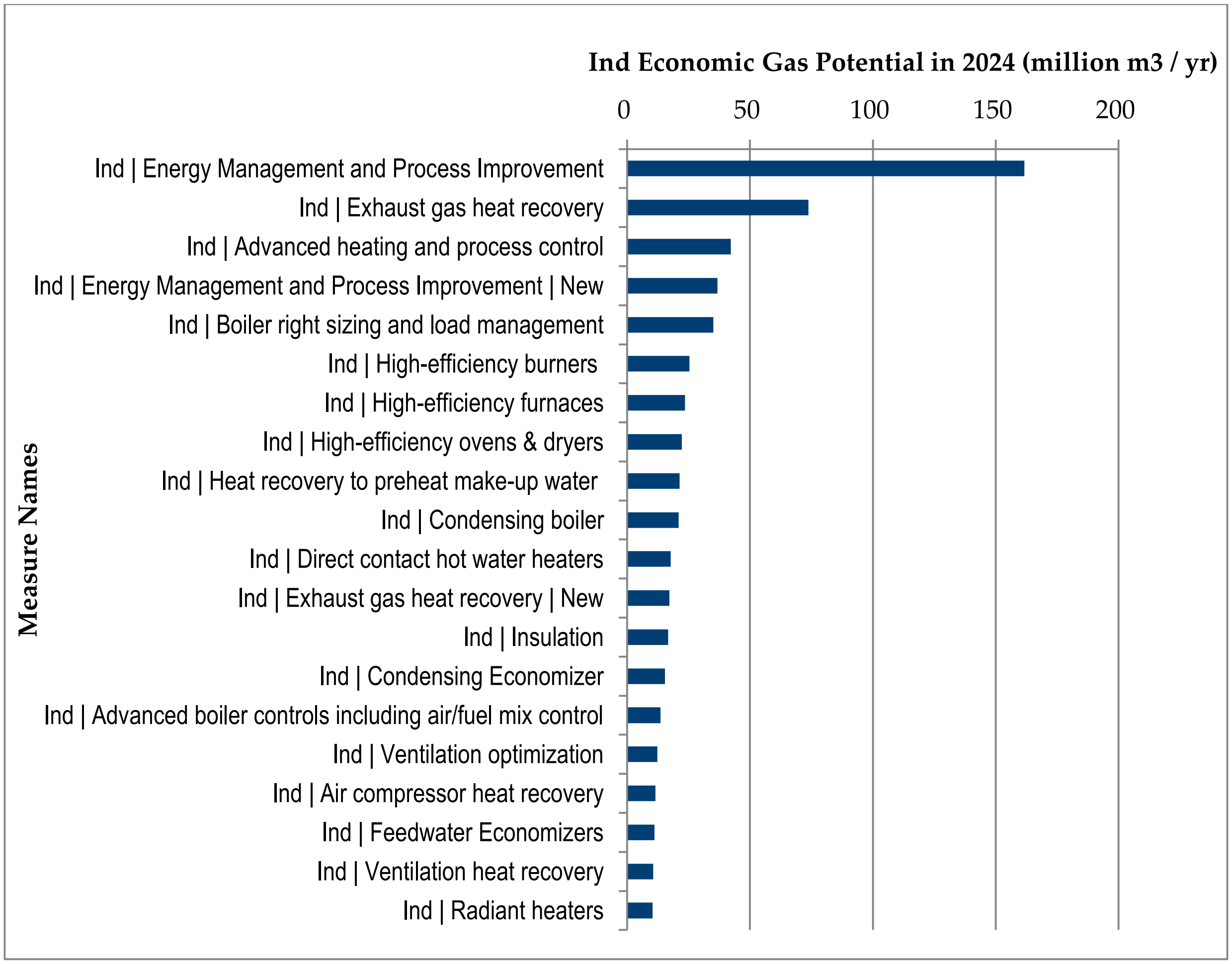
Industrial economic potential sums to 96 percent of the technical potential. The industrial measures that did not pass the TRC test also did not account for a large percentage of the total industrial technical potential, so their exclusion from the economic potential had minimal effect. The industrial measures with the highest economic savings potential are given in Figure 4-15.

Figure 4-15. Top Industrial Measures for Gas Savings Economic Potential (million m³/year)



Source: Navigant analysis, 2014

4.3 Economic Potential Sensitivity Analysis

Navigant performed sensitivity analyses evaluating the impact on economic potential from inclusion of CO_2 costs, avoided distribution costs and non-energy benefits. The following subsections describe the results of these sensitivity analyses.

4.3.1 CO_2 Price Sensitivity Analysis

To assess the impact of avoided CO_2 costs on the economic potential, Navigant also calculated economic potential using the Societal Cost Test (SCT). In this analysis, the SCT only differed from the TRC in its inclusion of CO_2 externality costs. Three scenarios were performed using CO_2 costs of $15 per tonne, $30 per tonne[19], and $60 per tonne. The present value of avoided CO_2 costs in the SCT calculation were added to other avoided costs in the SCT calculation, providing an increase in the monetary benefits of gas- and electricity-saving measures. The inclusion of these additional avoided costs pushed some additional measures into the "economic" classification (e.g., triple-glazed, low-E, argon windows). Thus, for some scenarios and points in time, including avoided CO_2 costs in the analysis led to an increase in economic potential.

To determine the avoided CO_2 costs for each measure, Navigant used the CO_2 intensities of energy listed below.

» Natural gas[20]: 1,879 grams of CO_2 equivalent (g CO_2) per m^3
» Electricity[21]: 130 g CO_2 equivalent per kWh

The following equation was used in the calculation of annual avoided CO_2 costs for each measure. The present value of these avoided costs over the life of each measure was added to the avoided costs in the SCT calculation.

Avoided CO_2 Cost = CO_2 Price X (Gas Savings X Gas CO_2 Intensity + Electricity Savings X Electricity CO_2 Intensity)

where:

CO_2 Price is the cost of CO_2 emissions in $/tonne
Gas Savings is the gas saved by a given measure in m^3/year
Gas CO_2 Intensity is the CO_2 intensity of gas in tonnes CO_2/m^3
Electricity Savings is the electricity saved by a given measure in kWh/year
Electricity CO_2 Intensity is the CO_2 intensity of electricity in tonnes CO_2/kWh

[19] Currently, British Columbia has implemented a CO_2 cost of $30 per tonne. http://www.fin.gov.bc.ca/tbs/tp/climate/A4.htm
[20] Source: Environment Canada, *Greenhouse Gas Sources and Sinks: 1990-2011*, Part 2, Table A8-1: CO_2 Emission Factors for Natural Gas, page 193.
[21] According to Ontario's Environment Commissioner, "In Ontario, the GHG intensity of electricity generation has declined from 290 grams CO_2e/kWh in 2000 to 130 grams of CO_2e /kWh in 2010, primarily due to the coal phase-out." Source: http://www.ecoissues.ca/index.php/GHG12_Electricity.

The SCT is identical to the TRC except that avoided CO_2 costs are included as benefits in the calculation. The SCT benefit-cost ratio is calculated in the model using the following equation:

$$SCT = \frac{PV(Avoided\ Costs + O\&M\ Savings + Avoided\ CO2\ Cost)}{PV(Technology\ Cost + Admin\ Costs)}$$

where:

PV( ) is the present value calculation that discounts cost streams over time.

Avoided Costs are the net monetary benefits resulting from gas, electric and water savings (e.g., avoided costs of infrastructure investments, as well as avoided commodity costs due to energy and water conserved by efficient measures).

Avoided CO_2 Costs are the net monetary benefits of avoided CO_2 costs from energy-saving measures.

Technology Cost is the net incremental equipment cost to the customer.

O&M Savings are the net non-energy benefits such as operation and maintenance cost savings.

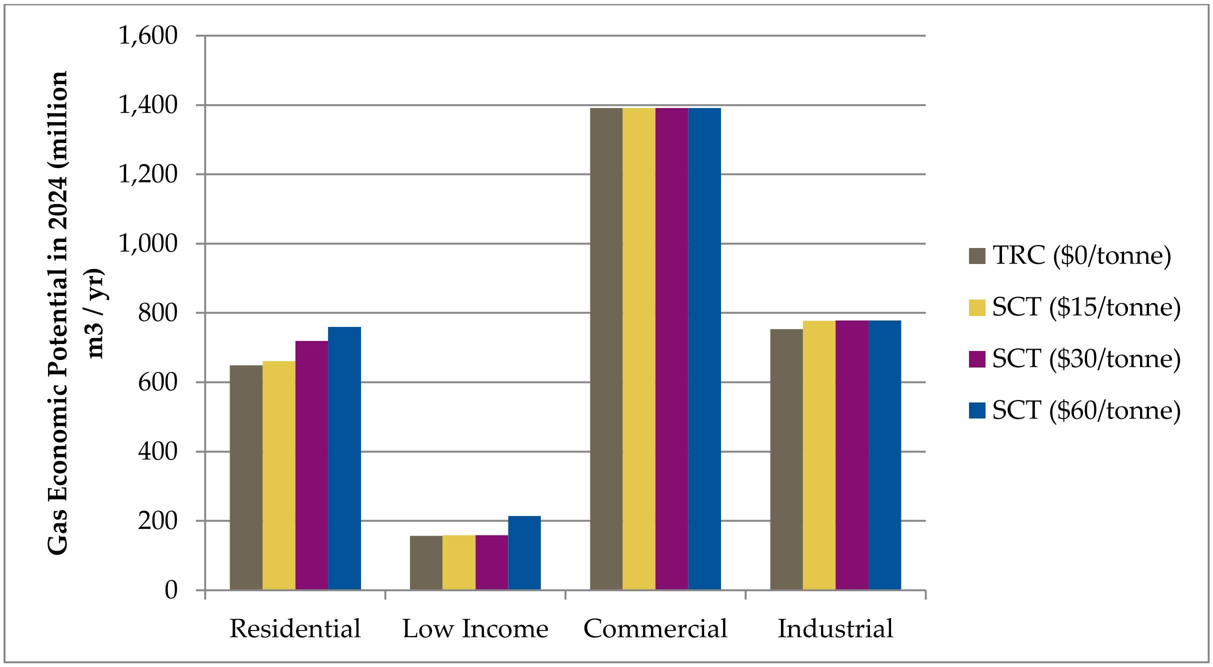
Admin Costs are the administrative costs incurred by the utility or program administrator.

The impact of avoided CO_2 costs on the economic potential varies by sector. Nearly all of the commercial and industrial measures passed the TRC test in the $0/tonne scenario, so little change was expected in these sectors due to an addition of a CO_2 price. Fifty-nine (59) percent of the residential and 39 percent of the low income technical potential did not pass the TRC test, allowing a better opportunity to be impacted by inclusion of CO_2 pricing.

Figure 4-16 and Table 4-12 demonstrate each CO_2 price scenario's impact on the sector-level totals. For reference, the SCT ($60/tonne) scenario increased low income economic gas potential by 36 percent relative to the TRC ($0/tonne) scenario in 2024; the residential potential increased by 17 percent; the industrial potential increased by 3 percent; and the changes in commercial potential were negligible. In 2015, the CO_2 prices correspond to increases in gas avoided costs[22] of 14, 28 and 57 percent for the $15/tonne, $30/tonne and $60/tonne scenarios, respectively. The percent increase in avoided gas costs due to the CO_2 prices fall over time because the CO2 prices, which escalate at the rate of inflation, grow at a slower rate than the forecasted avoided costs.

[22] Avoided gas costs used in this study are drawn from the currently filed avoided costs included in EB-2012-0394, Exhibit B, Table 2, Schedule 2

Figure 4-16. Gas Savings Economic Potential in 2024 by CO_2 Price Scenario (million m³/year)



Source: Navigant analysis, 2014

Table 4-12. Gas Savings Economic Potential in 2024 by CO_2 Price Scenario (million m³/year)

	TRC ($0/tonne)	SCT ($15/tonne)	SCT ($30/tonne)	SCT ($60/tonne)
Residential	649	661	719	759
Low Income	157	159	159	214
Commercial	1,391	1,391	1,391	1,391
Industrial	754	778	778	779
Total	2,950	2,988	3,047	3,143

Source: Navigant analysis, 2014

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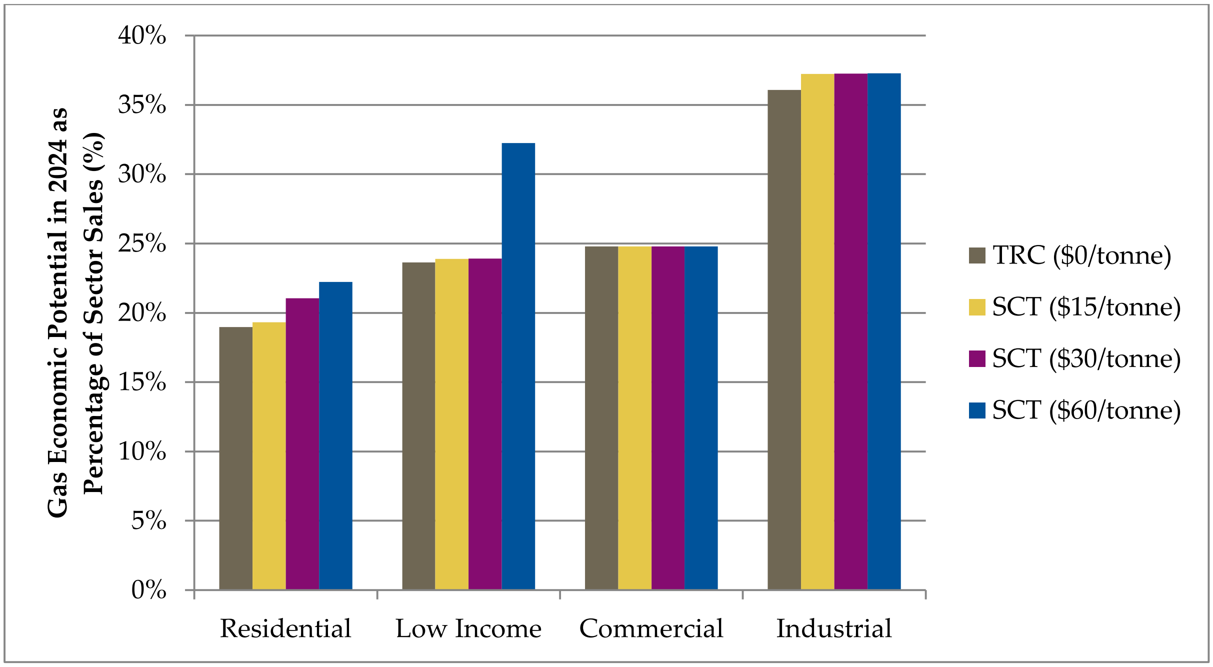
When looking at gas savings potential as a percentage of sector sales, a similar trend is apparent. Figure 4-17 and Table 4-13 provide the gas economic potential in 2024 as a percentage of sector sales for the CO_2 price sensitivities.

Figure 4-17. Gas Savings Economic Potential in 2024 as a Percentage of Sector Sales by CO_2 Price Scenario



Source: Navigant analysis, 2014

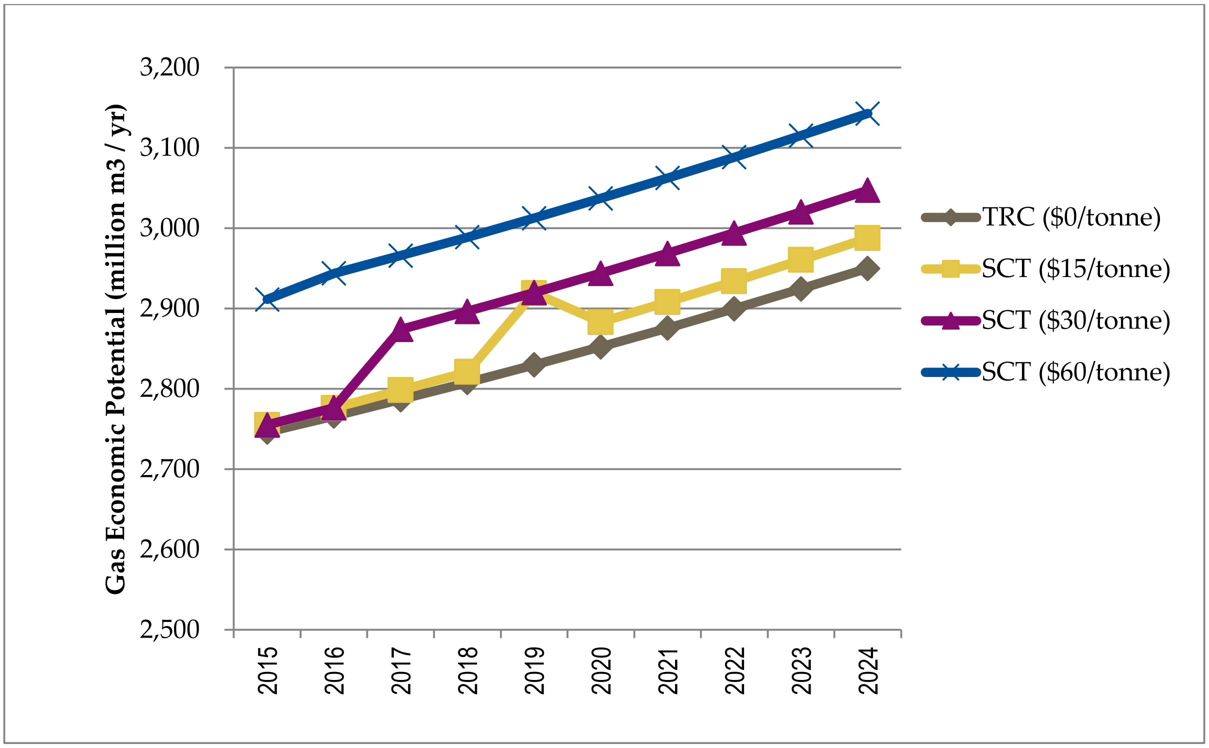
Table 4-13. Gas Savings Economic Potential in 2024 as a Percentage of Sector Sales by CO_2 Price Scenario

	TRC ($0/tonne)	SCT ($15/tonne)	SCT ($30/tonne)	SCT ($60/tonne)
Residential	19%	19%	21%	22%
Low Income	24%	24%	24%	32%
Commercial	25%	25%	25%	25%
Industrial	36%	37%	37%	37%
Total	25%	25%	26%	27%

Source: Navigant analysis, 2014

Figure 4-18 and Table 4-14 show the total economic potential over the study horizon for each of the CO_2 pricing scenarios. When looking at total economic potential in 2024, the SCT ($15/tonne) scenario is 1.3 percent larger, the SCT ($30/tonne) scenario is 3.3 percent larger, and the SCT ($60/tonne) scenario is 6.5 percent larger than the TRC ($0/tonne) baseline. "Triple-glazed, low-E, argon windows", "90 AFUE furnace replacements" and "tankless water heaters" are the three largest measures that become economic in certain customer segments due to the $60/tonne CO_2 price.

Figure 4-18. Gas Savings Economic Potential by CO_2 Price Scenario* (million m³/year)



*Note that vertical axis does not start at zero

Source: Navigant analysis, 2014

Table 4-14. Gas Savings Economic Potential by CO_2 Price Scenario (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
TRC ($0/tonne)	2,746	2,766	2,787	2,808	2,830	2,852	2,876	2,900	2,924	2,950
SCT ($15/tonne)	2,755	2,776	2,798	2,821	2,919	2,883	2,908	2,934	2,960	2,988
SCT ($30/tonne)	2,755	2,776	2,874	2,896	2,920	2,944	2,968	2,994	3,020	3,047
SCT ($60/tonne)	2,911	2,944	2,966	2,989	3,012	3,037	3,062	3,088	3,115	3,143

4.3.2 Avoided Distribution Cost Sensitivity Analysis

Enbridge initiated an assessment of avoided distribution costs that are realized through DSM program activity on a franchise wide basis. Avoided distribution costs by end-use services were identified and have been included as a sensitivity analysis to this potential study to assess the impact on economic potential (these costs are presented in Appendix B). In the first year of the simulation, the avoided distribution costs were found to increase the avoided costs from gas savings by 7.6 percent for "space heating", 7.0 percent for "space and water heating", 2.3 percent for "other industrial" and 2.2 percent for "water heating" end uses. These percentages decrease over time because avoided distribution costs grow at a slower rate than other avoided costs related to gas savings.

Avoided distribution costs improved the cost effectiveness of all measures, but only a few of those measures had TRC ratios close enough to the economic screening threshold to be pushed into the economic potential classification. "Industrial air curtains", "commercial roof insulation upgrades" and "residential, triple-glazed, low-E, argon windows" are the measures that become cost-effective in select time periods due to the inclusion of avoided distribution costs. By 2024, these measures accounted for an additional 10 million m^3 per year of gas savings, representing an increase in total economic potential of less than 1/2 percent. Table 4-15 shows the increase in economic potential resulting from the inclusion of avoided distribution costs.

Table 4-15. Increase in Gas Savings Economic Potential Due to Avoided Distribution Costs (million m^3/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Residential	0.0	0.0	1.2	2.3	3.5	4.7	5.9	7.2	8.4	9.7
Low Income	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commercial	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industrial	0.0	0.0	0.0	7.4	7.5	7.7	0.6	0.6	0.6	0.6
Total	0.0	0.0	1.2	9.7	11.1	12.4	6.6	7.8	9.0	10.3

Source: Navigant analysis, 2014

4.3.3 Non-Energy Benefits Sensitivity Analysis

In October of 2014, the Ontario Ministry of Energy ordered a directive to the OPA requiring that a 15 percent adder be applied to the benefits calculated for the TRC test to account for non-energy benefits associated with electric energy conservation programs, such as environmental, economic, and social benefits.[23] Though this directive is intended to apply to electric conservation programs, Enbridge desired to assess the impact on Economic potential if a non-energy benefit increase were also applied to gas conservation programs. Thus, Navigant conducted a sensitivity analysis on Economic potential that increased the monetary benefits of every measure by 15 percent.

[23] The directive from the Ontario Ministry of Energy can be accessed at http://www.powerauthority.on.ca/sites/default/files/news/MC-2014-2415.pdf

Table 4-16 provides the gas savings economic potential for the analysis that includes a 15 percent adder for non-energy benefits. Additionally, Table 4-17 shows the increase in economic potential relative to the case that does not include non-energy benefits (i.e., the case described in Section 4.2). The 15 percent adder leads to an additional 97 million m^3 per year of economic gas savings by 2024 (about a 3% increase).

Table 4-16. Gas Savings Economic Potential after Inclusion of Non-Energy Benefits (million m^3/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Residential	606	612	618	684	690	696	701	707	713	719
Low Income	151	151	152	153	154	155	156	157	158	159
Commercial	1,313	1,321	1,329	1,337	1,345	1,354	1,363	1,372	1,381	1,391
Industrial	685	692	700	722	730	739	748	758	768	778
Total	2,755	2,776	2,798	2,896	2,919	2,943	2,968	2,994	3,020	3,047

Source: Navigant analysis, 2014

Table 4-17. Increase in 2024 Gas Savings Economic Potential from Inclusion of Non-Energy Benefits

	Gas Savings (m3/year)	Percent of Sales (%)
Residential	71	2.1%
Low Income	2	0.3%
Commercial	0	0.0%
Industrial	24	1.2%
Total	97	0.8%

Source: Navigant analysis, 2014

5 Achievable Potential

This section contains details of the achievable potential analysis conducted by Navigant. Section 5.1 describes the approach to estimating achievable potential, including discussion of the base case, incentive approach, and model calibration. Next, section 5.2 provides achievable gas savings estimates by sector, customer segment, end use, and measure. Section 5.3 follows with details of the budget estimates and cost effectiveness associated with the base case. Section 0 offers the results of several sensitivity analyses conducted on the achievable potential estimates. Finally, section 5.5 compares the results of this study with the last potential study conducted for Enbridge.

5.1 Approach to Estimating Achievable Potential

This section provides a high-level summary of the approach to calculating achievable potential, which is fundamentally more complex than calculation of technical or economic potential. The adoption of energy-efficient technologies can be broken down into calculation of the "equilibrium" market share and calculation of the dynamic approach to equilibrium market share.

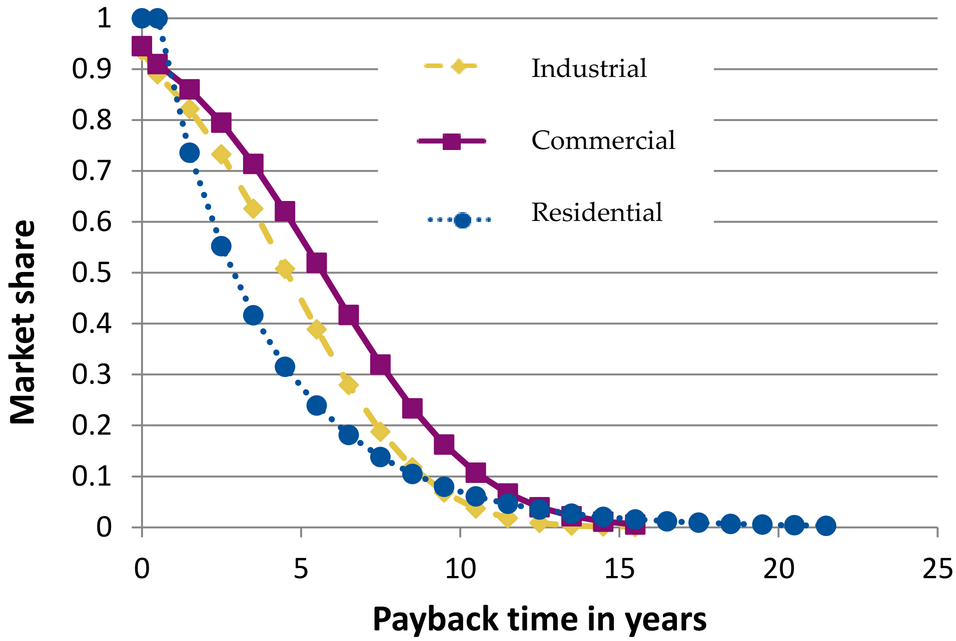
5.1.1 Calculation of "Equilibrium" Market Share

The equilibrium market share can be thought of as the percentage of individuals choosing to purchase a technology provided those individuals are fully aware of the technology and its relative merits (e.g., the energy- and cost-saving features of the technology). For energy-efficient technologies, a key differentiating factor between the base technology and the efficient technology is the energy and cost savings associated with the efficient technology. Of course, that additional efficiency often comes at a premium in initial cost. In efficiency potential studies, equilibrium market share is thus often calculated as a function of the payback time of the efficient technology relative to the inefficient technology. While such approaches certainly have limitations, they are nonetheless directionally reasonable and simple enough to permit estimation of market share for the dozens or even hundreds of technologies that are often considered in potential studies.

In this study, Navigant used equilibrium "payback acceptance" curves that were developed using primary research conducted by Navigant in the Midwest United States in 2012.[24] To develop these curves, Navigant conducted surveys of 400 residential, 400 commercial, and 150 industrial customers. These surveys presented decision makers with numerous "choices" between technologies with low up-front costs, but high annual energy costs, and measures with higher up-front costs but lower annual energy costs. Statistical analysis was conducted by Navigant to develop the set of curves shown in Figure 5-1, which were leveraged in this study. Though Enbridge-specific data were not available to estimate these curves, Navigant considers that the nature of the decision-making process is such that the data developed using U.S. customers represents the best data available at the time of this study.

[24] A detailed discussion of the methodology and findings of this research are contained in "Demand Side Resource Potential Study," prepared for Kansas City Power and Light, August 2013.

Figure 5-1. Payback Acceptance Curves



Source: Navigant

Since the payback time of a technology can change over time, as technology costs and/or energy costs change over time, the "equilibrium" market share can also change over time. The equilibrium market share is therefore recalculated for every time step within the market simulation to ensure the dynamics of technology adoption take this effect into consideration. As such, "equilibrium" market share is a bit of an oversimplification and a misnomer, as it can itself change over time and is therefore never truly in equilibrium, but it is used nonetheless to facilitate understanding of the approach.

5.1.2 Calculation of the Approach to Equilibrium Market Share

Two approaches are used for calculating the approach to equilibrium market share, one for new technologies or those being modelled as "retrofit" measures, and one for technologies simulated as ROB, or new construction (NEW) measures. Each of these approaches can be better understood by visiting Navigant's technology diffusion simulator, available at:
http://forio.com/simulate/navigantsimulations/technology-diffusion-simulation.
A high-level overview of each approach is also provided below.

5.1.2.1 Retrofit Technology Adoption Approach

Retrofit (RET) technologies employ an enhanced version of the classic Bass diffusion model[25,26] to simulate the S-shaped approach to equilibrium that is observed again and again for technology

[25] Bass, Frank (1969). "A new product growth model for consumer durables". Management Science 15 (5): p215–227.
[26] See Sterman, John D. *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Irwin McGraw-Hill. 2000. p. 332.

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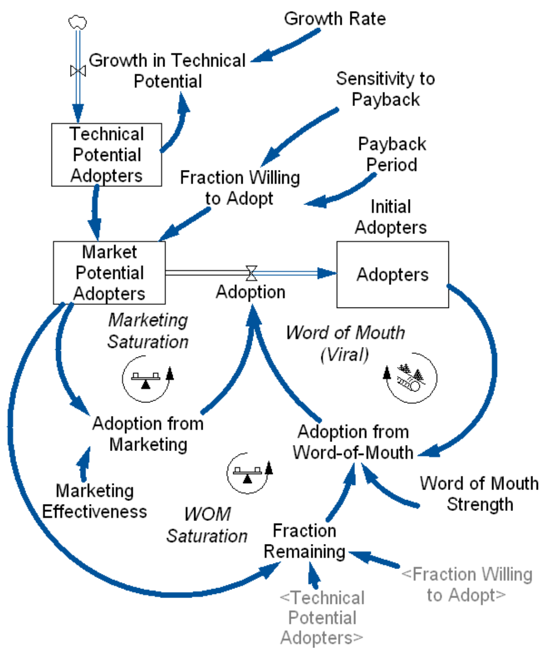
adoption. Figure 5-2 provides a stock/flow diagram illustrating the causal influences underlying the Bass model. In this model, market potential adopters "flow" to adopters by two primary mechanisms – adoption from external influences, such as marketing and advertising, and adoption from internal influences, or "word-of-mouth." The "fraction willing to adopt" was estimated using the payback acceptance curves illustrated in Figure 5-1.

The marketing effectiveness and word-of-mouth parameters for this diffusion model were estimated drawing upon case studies where these parameters were estimated for dozens of technologies[27]. Recognition of the positive, or self-reinforcing, feedback generated by the "word-of-mouth" mechanism is evidenced by increasing discussion of the concepts such as social marketing as well as the term "viral," which has been popularized and strengthened most recently by social networking sites such as Facebook and YouTube. However, the underlying positive feedback associated with this mechanism has been ever present and a part of the Bass diffusion model of product adoption since its inception in 1969.

Figure 5-2. Stock/Flow Diagram of Diffusion Model for New Products and Retrofits



Source: Navigant Consulting, Inc.

The model illustrated above generates the commonly seen S-shaped growth of product adoption and is a simplified representation of that employed in DSMSim.

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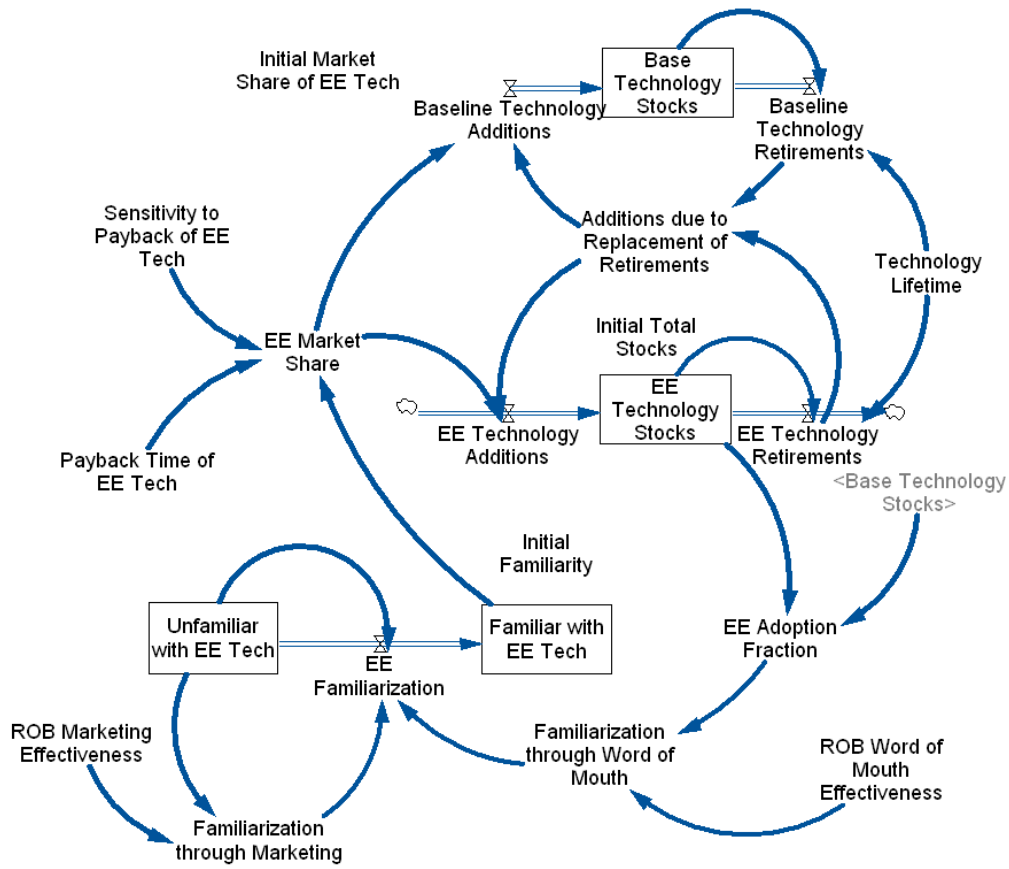
[27] See Mahajan, V., Muller, E., and Wind, Y. (2000). New Product Diffusion Models. Springer. Chapter 12 for estimation of the Bass diffusion parameters for dozens of technologies. This model uses a value of 0.10 for the word-of-mouth strength in the base case scenario. The Marketing Effectiveness parameter for the base case scenario varied between 0.019 and 0.048, depending on the sector (values were determined as part of the calibration process). These values compare reasonably with the "most likely" value of 0.021 (75th percentile value is 0.055) per Mahajan 2000.

5.1.2.2 Replace-on-Burnout Technology Adoption Approach

The dynamics of adoption for replace-on-burnout technologies is somewhat more complicated than for new/retrofit technologies since it requires simulating the turnover of long-lived technology stocks. The DSMSim model tracks the stock of all technologies, both base and efficient, and explicitly calculates technology retirements and additions consistent with the lifetime of the technologies. Such an approach ensures that technology "churn" is considered in the estimation of market potential, since only a fraction of the total stock of technologies are replaced each year, which affects how quickly technologies can be replaced. A model that endogenously generates growth in the familiarity of a technology, analogous to the Bass approach described above, is overlaid on the stock tracking model to capture the dynamics associated with the diffusion of technology familiarity. A simplified version of the model employed in DSMSim is illustrated graphically in Figure 5-3.

Figure 5-3. Stock/Flow Diagram of Diffusion Model for Replace-on-Burnout Measures

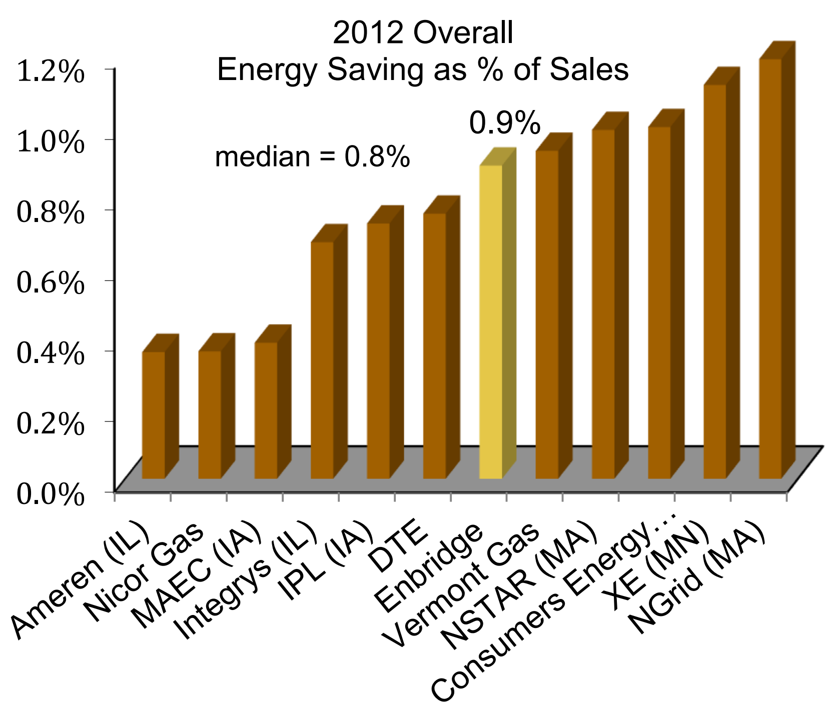


Source: Navigant Consulting, Inc.

5.1.3 Benchmarking

As part of this study, Navigant benchmarked achieved levels of gas savings and costs for 12 investor owned utilities (IOUs), including Enbridge. As 2012 data were readily available at the time this study was conducted, comparisons were made using 2012 savings and costs for each utility. A key finding of this benchmarking analysis is that Enbridge's 2012 programs achieved greater than median levels of savings (Gross savings was 0.9 percent of sales/year) at lower than median cost ($0.33/first-year m^3 saved), as illustrated in Figure 5-4 and in Table 5-1. Additional details of this benchmarking analysis are provided in Appendix E. As noted in the Appendix, this benchmarking study was limited in scope due to limited available budget, and focused on data that were readily available (which can sometimes result in comparisons that are not perfectly "apples to apples"). As such, results should be taken as indicative rather than definitive.

Figure 5-4. 2012 Gross Energy Savings as a Percentage of Gas Sales



Source: Navigant Consulting, Inc.

Table 5-1. 2012 Natural Gas DSM Results[28] over All Sectors

	Spending as % of Revenue	Gross Energy Savings as % of Sales	Retail Cost of Energy ($/m^3)	Cost of First Year Savings ($/m^3)
All Region Median	2.6%	0.8%	$0.20	$0.94
Enbridge	1.6%	0.9%	$0.18	$0.33

Source: Navigant Consulting, Inc.

5.1.4 Definition of "Base Case"

A challenging element of estimating achievable potential is how to define a "base case" scenario. Some studies use what is often termed a "realistic achievable" scenario as the base case. Realistic achievable potential is that which can reasonably be expected to be achieved assuming a typical program implementation, technology adoption, and incentive levels. However, this approach does have its pitfalls in that often the assumptions about the rate of technology adoption and the incentive levels used are somewhat arbitrary, and can differ greatly from study to study. The savings and budgets required to achieve those savings can therefore also vary widely depending on the assumptions used in the analysis.

In this study, Enbridge desired to understand the potential at various spending levels, ranging from about $28 million annually to $156 million annually (adjusted for inflation). Current Enbridge "budgets" for energy efficiency are $32 million annually. Since Enbridge has been running energy efficiency programs for many years, and since the cost of historic savings is in line with Navigant's expectations based on its experience in other jurisdictions, it seemed reasonable to define the "base case" in this study as that which corresponds with Enbridge's current budget level of $32 million per year (adjusted for an assumed 2 percent/year inflation, which results in a $35 million/year average budget over the 10-year study horizon).[29] This base case scenario is certainly deemed by Navigant to be "realistic," though higher savings levels could also be achieved at higher budget levels, as detailed in the sensitivity analysis described in Section 5.3.

5.1.5 Model Calibration

Any model simulating *future* product adoption faces challenges with 'calibration,' as there is no future world against which one can compare simulated with actual results. Engineering models, on the other

[28] Sales (both m^3 and dollars) include both distribution sales and transport sales.

[29] The base case budget corresponds with an average budget level over ten years ($35 million) equal to that if a starting budget of $32 million were increased at 2%/year inflation for 10 years (per the RFP). However, the actual budget simulated is not constrained precisely by the 2%/year increase, since budgets are an output of the model, not an input. For each program and for the portfolio, the percentage change in the year after year budget will vary depending on the forecast technology adoption. This base case budget is inclusive of portfolio-level administration and market transformation activities.

hand, can often be calibrated to a higher degree of accuracy since simulated performance can be compared directly with performance of actual hardware. Unfortunately, DSM potential models do not have this luxury, and therefore must rely on other techniques to provide both the developer and the recipient of model results with a level of comfort that simulated results are reasonable. For this potential study, Navigant took a number of steps to ensure that forecast model results were reasonable, including:

- Comparing 2015 forecast values, by program, against historic achieved savings for the past several years, considering drivers of differences likely caused by changes in the measures.
- Calculating 2015 forecast spending per savings ($\$/m^3$ saved -- both first year and lifetime savings) costs for each program and comparing against results for the past several years.
- Calculating 2015 forecast portfolio-level savings as a percentage of gas sales and comparing them with results observed in other jurisdictions.

Navigant adjusted model parameters including assumed incentive levels and technology diffusion coefficients to obtain close agreement across a wide variety of metrics compared for the "base case" scenario. This process ensures that forecast potential is grounded against real-world results considering the many factors that come into play in determining likely adoption of energy-efficient measures, including both economic and non-economic factors.

5.1.6 Incentives

Often, potential studies will set incentive levels by using a constant percentage of incremental cost across all measures (e.g., 25%, 33%, 50%, etc.). However, this methodology, while common in potential studies, will result in a portfolio that is more expensive than if the incentive levels are allowed to vary by measure using methods that come down the EE supply curve more efficiently.[30] In this study, we follow the approach described in detail in Welch, Richerson-Smith (2012), whereby we come down the efficiency supply curve by limiting the maximum $\$/m^3$ paid (calculated on a levelized cost basis) for any given measure (termed the "threshold incentive" value). This methodology will first reduce the incentive levels (from a starting point of 100%) of those measures that are most expensive on a levelized $\$/ m^3$ basis. For instance, at a purely illustrative threshold incentive value of $\$0.03/ m^3$ saved (levelized), any measure with a levelized cost below this value will still offer an incentive of 100% of the measure's incremental cost (to maximize adoption of the measures that are least expensive on a levelized $\$/ m^3$ basis). Measures that exceed this levelized cost will have incentives lower than 100% in proportion to their levelized cost. Continuing with this hypothetical example using a $\$0.03/ m^3$ incentive threshold, a measure that has a levelized cost of $\$0.06/ m^3$ would receive an incentive that is 50% of the incremental cost of that measure (or $0.03/$0.06). This approach, as described by Welch and Richerson-Smith (2012), results not only in a less expensive portfolio, but also in a portfolio that provides a greater net present value of lifetime benefits (which factors in the life of the measure) than an approach that fixes the percentage of incremental cost across all measures.

As described in Sections 5.1.4 and 5.1.5, incentive levels were one of several parameters adjusted as part of the model calibration process. Specifically, Navigant adjusted assumed incentive levels to achieve

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[30] See Welch, Richerson-Smith (2012). "Incentive Scenarios in Potential Studies: A Smarter Approach" Presented at the ACEEE Summer Study on Energy Efficiency in Buildings. Monterey, CA. August 2012. Available at http://www.aceee.org/files/proceedings/2012/data/papers/0193-000050.pdf.

general agreement across a wide variety of cost and savings metrics with historical Enbridge results. This process resulted in a base case incentive level in the first year that corresponds with a weighted average percentage of incremental cost (though this value will vary by measure and over time as the measure mix changes, as described above) of about 24% in Residential, 15% in Commercial, 9% in industrial, and 85% in Low Income. For the budget scenarios described in Section 5.2, the threshold incentive value was adjusted along with the assumed marketing effectiveness to achieve higher forecast savings (with correspondingly higher budgets).

5.2 *Achievable Potential Savings Results*

This sub-section provides DSMSim results pertaining to natural gas total achievable potential at different levels of aggregation. Results are shown by sector, customer segment, end use and by highest-impact measures.

5.2.1 Overall Achievable Potential, in Comparison with Technical and Economic

As shown in Figure 5-5 and Table 5-2, achievable potential, which accounts for the rate of energy efficiency acquisition, grows to 7.8% of forecast gas sales in 2024, or 0.78%/year on average over the 10-year study horizon, under the "base case" achievable potential scenario. This degree of achievable potential is consistent with Navigant's observations of savings levels in other jurisdictions it has studied, providing a degree of confidence that the results are reasonable. As will be seen in Section 5.3, higher savings are ultimately achievable with higher budget assumptions.

Values shown below for achievable potential are termed "cumulative achievable" potential, in that they represent the accumulation of each year's annual achievable (e.g., an annual achievable potential of 0.8%/year, for ten years, would result in a cumulative achievable potential of 8% of forecast sales). We show cumulative values when comparing achievable, technical and economic potential since they provide a view of how much of the economic potential has been harvested. Economic potential, as defined in this study, can be thought of as a bucket of potential from which programs can draw over time. Achievable potential represents the draining of that bucket, the rate of which is governed by a number of factors, including the lifetime of measures (for ROB technologies), market effectiveness, incentive levels, and customer willingness to adopt, among others. If the cumulative achievable potential in Figure 5-6 and Table 5-3 below ultimately reached the economic potential, it would signify that all economic potential in the "bucket"' had been drawn down, or harvested. We also see that achievable potential reaches 7.8% of forecast sales by 2024, meaning that roughly 31% of economic potential (which is 25% of sales in 2024) has been harvested by the end of the study period.

In the remainder of this section, we instead show annual achievable potential, since these values are typically of greatest interest to utilities and other stakeholders for planning purposes.

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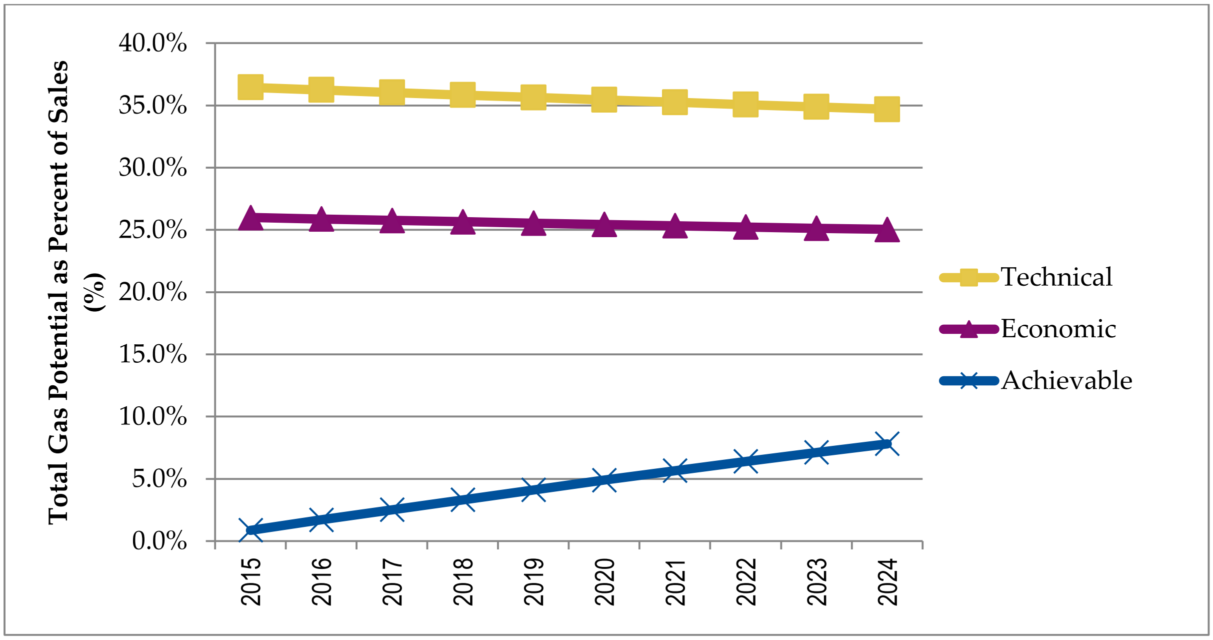
Figure 5-5. Total Gas Savings Cumulative Potential as a Percentage of Forecast Gas Sales



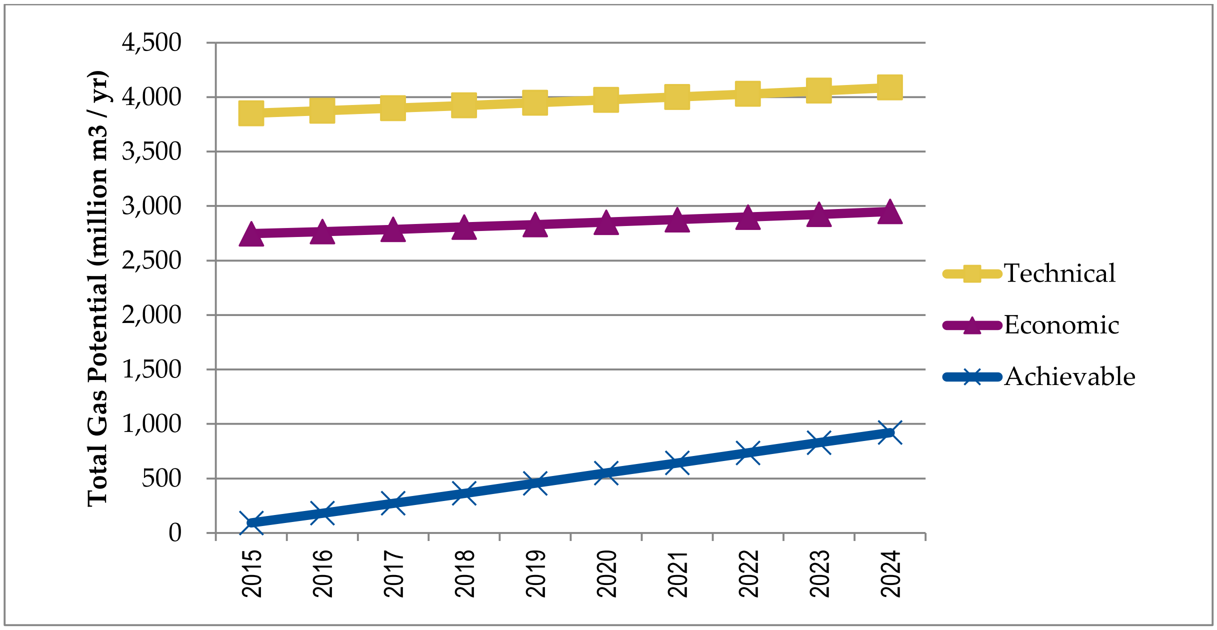
Source: Navigant analysis, 2014

Table 5-2. Total Gas Savings Cumulative Potential as a Percentage of Gas Sales

Year	Technical	Economic	Cumulative First-Year Achievable	Incremental Annual Achievable
2015	36.5%	26.0%	0.9%	0.9%
2016	36.2%	25.9%	1.7%	0.8%
2017	36.0%	25.8%	2.5%	0.8%
2018	35.8%	25.7%	3.3%	0.8%
2019	35.6%	25.5%	4.1%	0.8%
2020	35.4%	25.4%	4.9%	0.8%
2021	35.3%	25.3%	5.7%	0.8%
2022	35.1%	25.2%	6.4%	0.8%
2023	34.9%	25.1%	7.1%	0.8%
2024	34.7%	25.0%	7.8%	0.8%

Source: Navigant analysis, 2014

Figure 5-6. Gas Savings Cumulative Potential (million m³/year)



Source: Navigant analysis, 2014

Table 5-3. Gas Savings Potential (million m³/year)

Year	Technical	Economic	Cumulative Achievable	Incremental Annual Achievable
2015	3,851	2,746	91	91
2016	3,874	2,766	181	90
2017	3,898	2,787	272	90
2018	3,922	2,808	363	91
2019	3,948	2,830	456	93
2020	3,974	2,852	549	93
2021	4,001	2,876	642	93
2022	4,029	2,900	735	93
2023	4,058	2,924	828	93
2024	4,087	2,950	920	93

Source: Navigant analysis, 2014

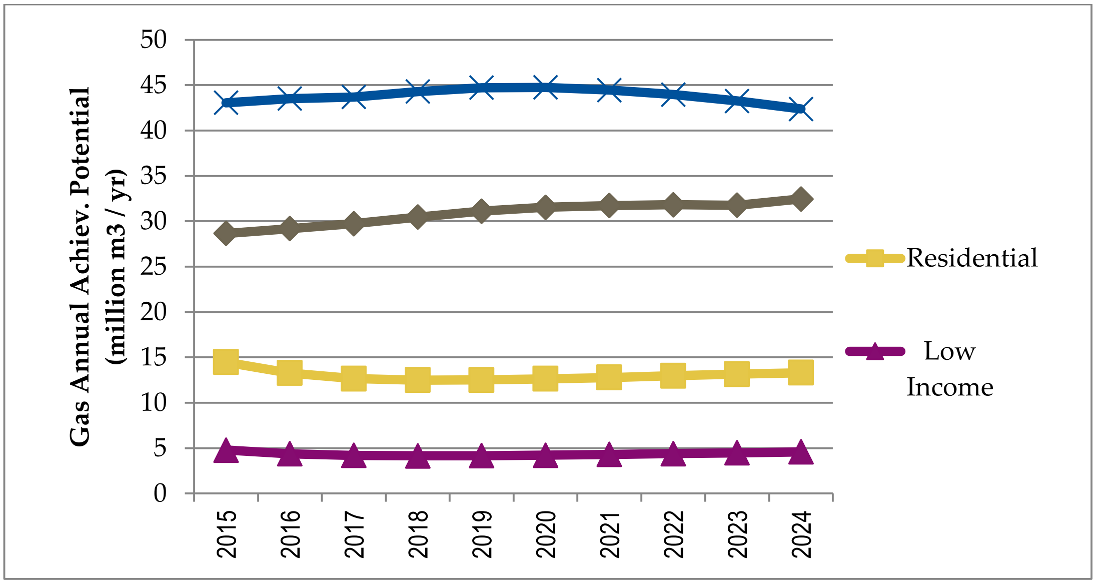
5.2.2 Results by Sector

The ramp-up and general characteristics of cumulative first-year achievable gas savings over time differ markedly from the technical and economic potential due to the following:

- The rate of adoption of replace-on-burnout measures is limited by stock turnover, which can be a slow process for measures with long lives;
- Customers' awareness of efficient measures must build up over time through marketing and word-of-mouth before adoption rates can become significant;
- Market share among efficient and baseline measures is distributed based on relative economic attractiveness (rather than a winner-takes-all approach), meaning that some fraction of eligible customers will continue to choose the baseline measure over the efficient measure.

Figure 5-7 and Table 5-4 show the annual achievable potential by sector. In absolute magnitude, the commercial sector provides the greatest opportunity for achievable potential, though as a percentage of sales (as shown in subsequent graphs), the industrial sector offers the greatest opportunity for achievable potential.

Figure 5-7: Gas Savings Annual Achievable Potential by Sector (million m³/year)



Source: Navigant analysis, 2014

Table 5-4. Gas Savings Annual Achievable Potential by Sector (million m³/year)

Year	Residential	Low Income	Commercial	Industrial	Total
2015	14	5	43	29	91
2016	13	4	44	29	90
2017	13	4	44	30	90
2018	12	4	44	30	91
2019	13	4	45	31	93
2020	13	4	45	32	93
2021	13	4	44	32	93
2022	13	4	44	32	93
2023	13	4	43	32	93
2024	13	5	42	32	93
Total	130	44	438	308	920

Source: Navigant analysis, 2014

Figure 5-8 and Table 5-5 provide the annual achievable gas potential as a percentage of sector sales. On average, the industrial measures evaluated in this study are more economically attractive than other measures, and therefore industrial measures are able to achieve greater savings as a percentage of economic potential than measures in other sectors. Across all sectors, retrofit measures are the major driver in the growth of achievable potential.

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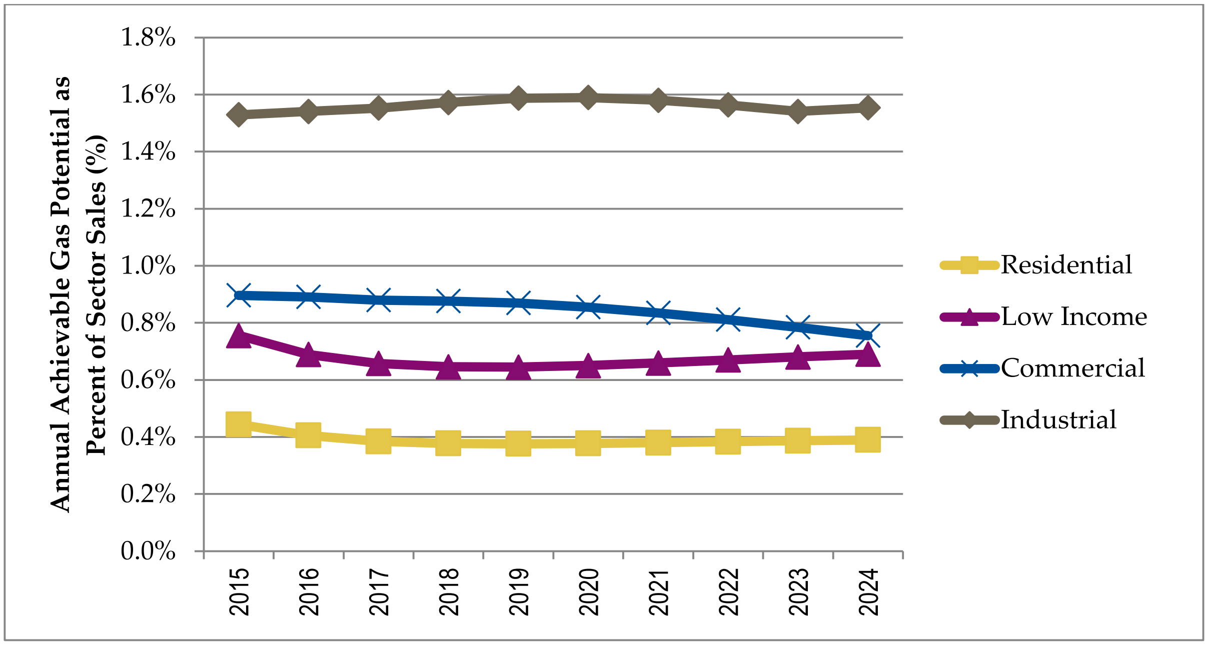
Figure 5-8. Gas Savings Annual Achievable Potential as a Percentage of Sector Sales



Source: Navigant analysis, 2014

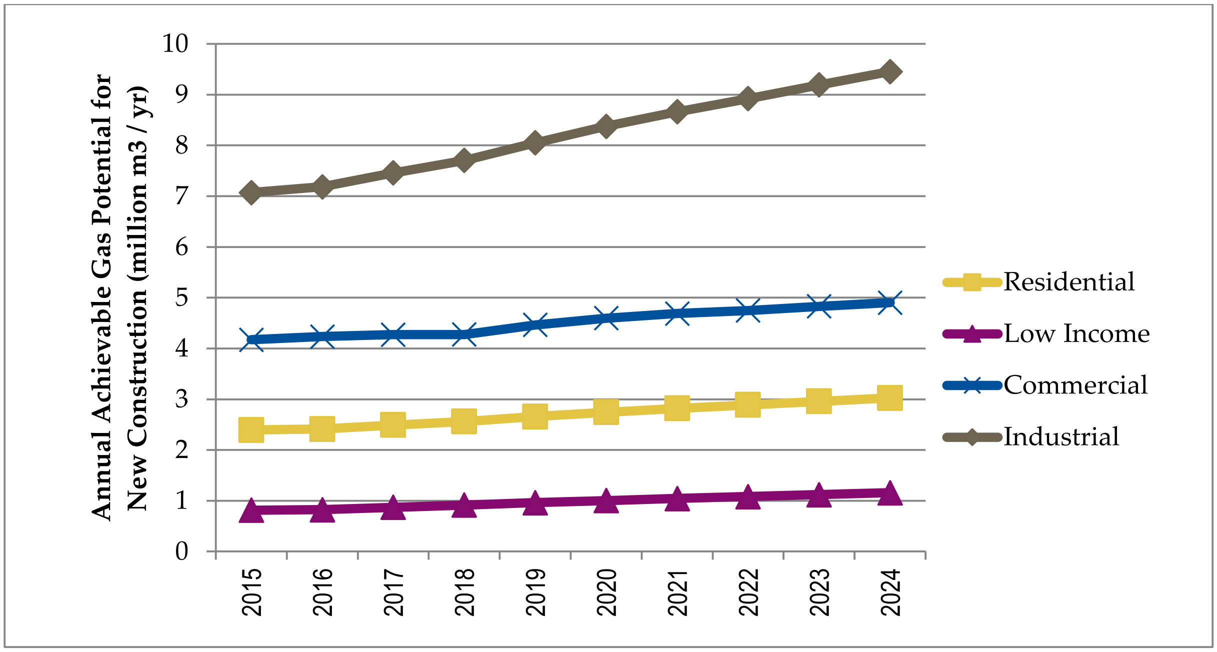
Table 5-5. Gas Savings Annual Achievable Potential as a Percentage of Sector Sales

Year	Residential	Low Income	Commercial	Industrial	Total
2015	0.4%	0.8%	0.9%	1.5%	0.9%
2016	0.4%	0.7%	0.9%	1.5%	0.8%
2017	0.4%	0.7%	0.9%	1.6%	0.8%
2018	0.4%	0.6%	0.9%	1.6%	0.8%
2019	0.4%	0.6%	0.9%	1.6%	0.8%
2020	0.4%	0.7%	0.9%	1.6%	0.8%
2021	0.4%	0.7%	0.8%	1.6%	0.8%
2022	0.4%	0.7%	0.8%	1.6%	0.8%
2023	0.4%	0.7%	0.8%	1.5%	0.8%
2024	0.4%	0.7%	0.8%	1.6%	0.8%
Total	3.8%	6.6%	7.8%	14.8%	7.8%

Source: Navigant analysis, 2014

The annual achievable gas savings potential from new construction only (as compared with the combination of new construction and existing buildings shown above) is provided in Figure 5-9 and Table 5-6.

Figure 5-9. Gas Savings Annual Achievable Potential by Sector for New Construction (million m³/year)



Source: Navigant analysis, 2014

Table 5-6. Gas Savings Achievable Potential by Sector for New Construction (million m³/year)

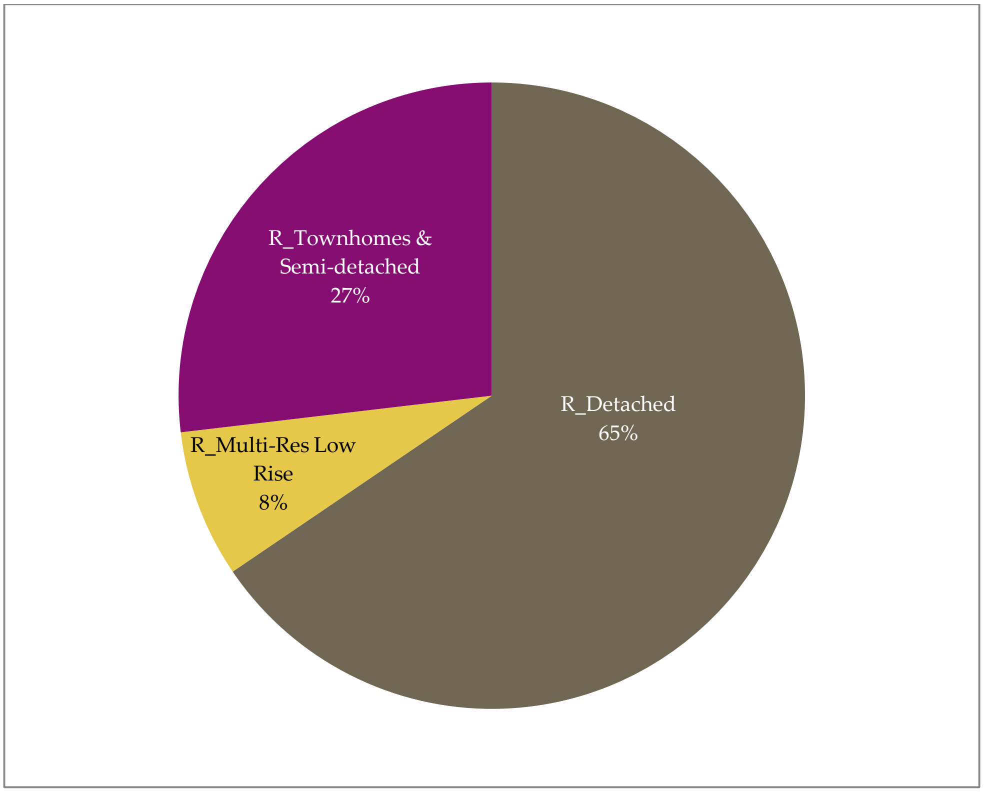
Year	Residential	Low Income	Commercial	Industrial	Total
2015	2	1	4	7	14
2016	2	1	4	7	15
2017	2	1	4	7	15
2018	3	1	4	8	15
2019	3	1	4	8	16
2020	3	1	5	8	17
2021	3	1	5	9	17
2022	3	1	5	9	18
2023	3	1	5	9	18
2024	3	1	5	9	19
Total	27	10	45	82	164

Source: Navigant analysis, 2014

5.2.3 Results by Customer Segment

The gas achievable potential shown in Figure 5-10 and Table 5-7 is broken out by residential customer segment. As expected, the majority of achievable potential comes from detached homes, consistent with the much larger portion of gas consumed in this building segment.

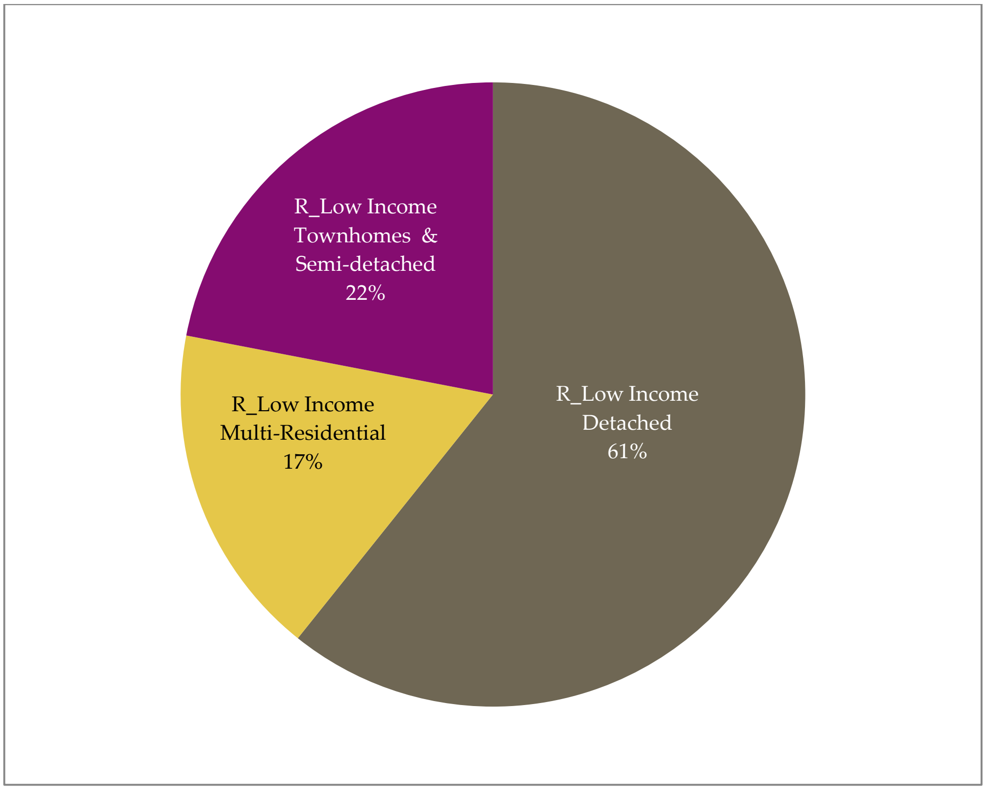
Figure 5-10. Gas Savings Achievable Potential by Residential Customer Segment in 2024



Source: Navigant analysis, 2014

The gas achievable potential shown in Figure 5-11 and Table 5-8 is broken out by low income customer segments.

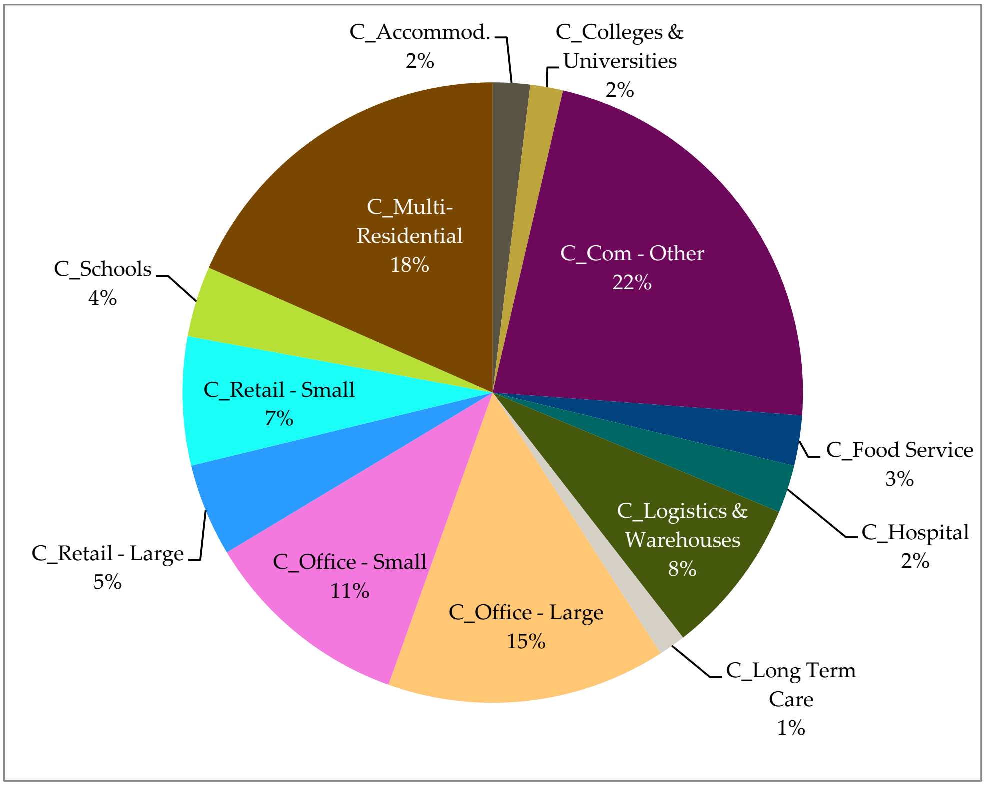
Figure 5-11: Gas Savings Achievable Potential by Low Income Customer Segment in 2024



Source: Navigant analysis, 2014

The gas achievable potential shown in Figure 5-12 and Table 5-9 is summarized by commercial customer segment.

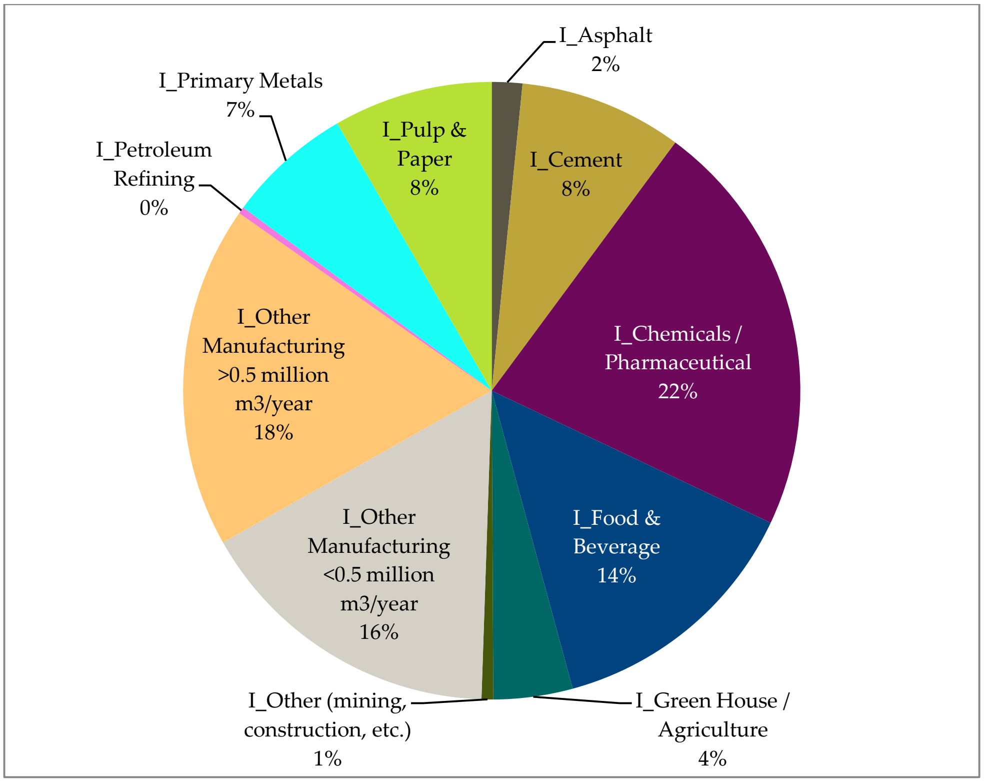
Figure 5-12: Gas Savings Achievable Potential by Commercial Customer Segment in 2024



Source: Navigant analysis, 2014

Figure 5-13 and Table 5-10 show the gas achievable potential disaggregated by industrial customer segments.

Figure 5-13: Gas Savings Achievable Potential by Industrial Customer Segment in 2024



Source: Navigant analysis, 2014

Table 5-7. Gas Savings Annual Achievable Potential by Residential Customer Segment (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
R_Detached	9.3	8.6	8.3	8.2	8.2	8.3	8.4	8.5	8.7	8.8	85.3
R_Multi-Residential Low Rise	1.3	1.1	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	9.9
R_Townhomes & Semi-detached	3.8	3.5	3.4	3.4	3.4	3.4	3.4	3.5	3.6	3.6	35.0
Totals	14.5	13.3	12.7	12.5	12.5	12.6	12.8	13.0	13.1	13.3	130.3

Source: Navigant analysis, 2014

Table 5-8. Gas Savings Annual Achievable Potential by Low Income Customer Segment (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
R_Low Income Detached	2.7	2.5	2.5	2.5	2.5	2.6	2.7	2.7	2.8	2.9	26.5
R_Low Income Multi-Residential	1.0	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	7.5
R_Low IncomeTownhomes & Semi-detached	1.0	1.0	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	9.6
Totals	4.8	4.4	4.2	4.1	4.2	4.2	4.3	4.4	4.5	4.6	43.7

Source: Navigant analysis, 2014

Table 5-9. Gas Savings Annual Achievable Potential by Commercial Customer Segment (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
C_Accommodation	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.8	0.8	8.5
C_Colleges & Universities	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	7.5
C_Com - Other	9.5	9.6	9.7	9.9	10.0	10.1	10.1	10.0	9.9	9.8	98.7
C_Food Service	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.1	1.1	11.5
C_Hospital	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	10.9
C_Logistics & Warehouses	3.5	3.6	3.6	3.6	3.7	3.7	3.7	3.6	3.5	3.5	35.9
C_Long Term Care	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	6.2
C_Office - Large	6.4	6.5	6.5	6.5	6.5	6.5	6.4	6.3	6.2	6.0	63.8
C_Office - Small	4.6	4.7	4.8	4.8	4.9	4.9	4.9	4.8	4.8	4.7	47.9
C_Retail - Large	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.0	21.2
C_Retail - Small	2.8	2.9	2.9	3.0	3.0	3.0	3.0	3.0	2.9	2.9	29.3
C_Schools	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	16.1
C_Multi-Residential	7.9	8.0	8.1	8.2	8.3	8.3	8.2	8.1	7.9	7.7	80.6
Totals	43.1	43.5	43.7	44.3	44.7	44.8	44.5	44.0	43.2	42.4	438.1

Source: Navigant analysis, 2014

Table 5-10. Gas Savings Annual Achievable Potential by Industrial Customer Segment (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
I_Asphalt	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.9
I_Cement	2.3	2.4	2.4	2.5	2.6	2.7	2.8	2.8	2.9	2.9	26.4
I_Chemicals / Pharmaceutical	6.3	6.4	6.6	6.7	6.8	6.9	7.0	7.0	6.9	6.9	67.5
I_Food & Beverage	3.9	4.0	4.1	4.2	4.3	4.3	4.4	4.4	4.4	4.4	42.4
I_Green House / Agriculture	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	12.8
I_Other (including mining, construction, etc.)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.9
I_Other Manufacturing <0.5 million m3/year	4.6	4.7	4.8	4.9	5.1	5.2	5.2	5.3	5.3	5.3	50.3
I_Other Manufacturing >0.5 million m3/year	5.1	5.2	5.3	5.4	5.6	5.7	5.7	5.8	5.8	5.8	55.3
I_Petroleum Refining	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.1
I_Primary Metals	2.1	2.1	2.1	2.1	2.0	2.0	1.9	1.9	1.8	2.3	20.2
I_Pulp & Paper	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.5	2.7	25.7
Totals	28.7	29.2	29.7	30.5	31.1	31.5	31.7	31.8	31.8	32.4	308.4

Source: Navigant analysis, 2014

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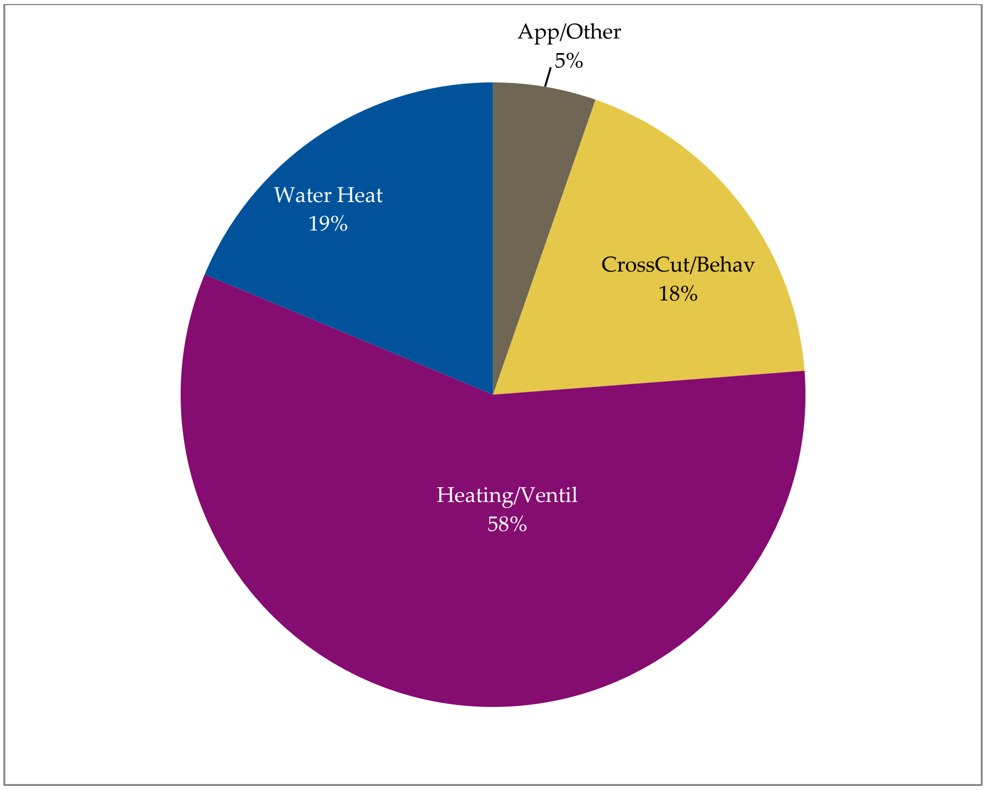
5.2.4 Results by End Use

The gas achievable potential broken out by residential end use is provided in Figure 5-14 and Table 5-11.

Figure 5-14: Gas Savings Achievable Potential by Residential End Use in 2024



Source: Navigant analysis, 2014

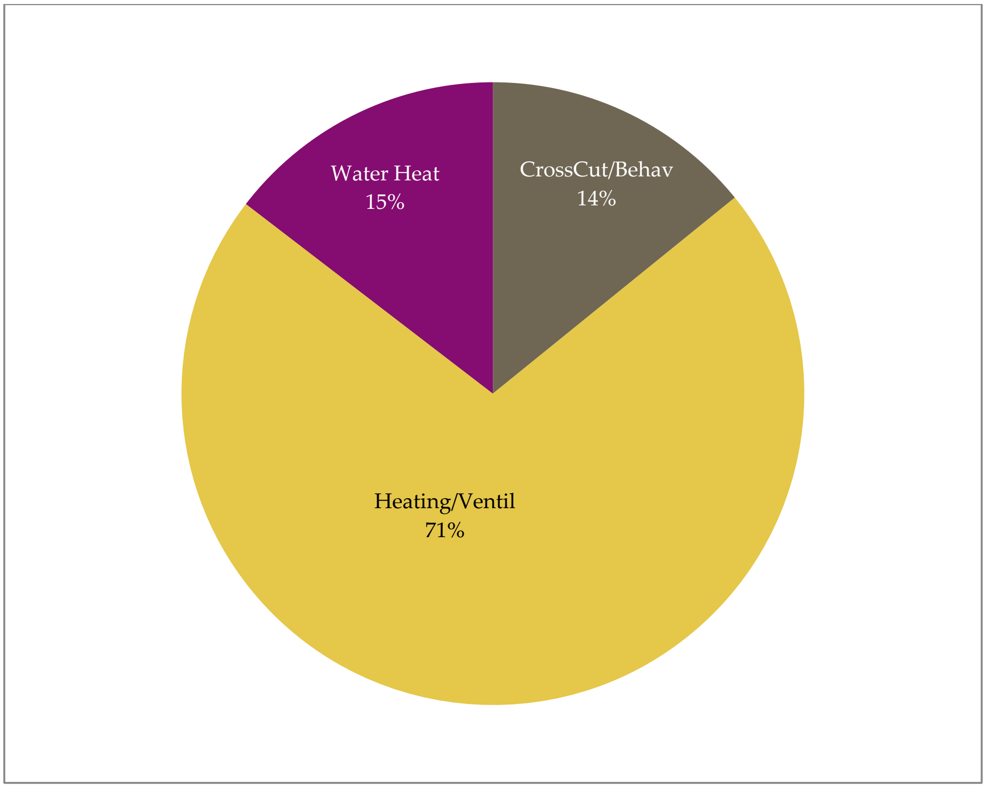
Table 5-11: Gas Savings Annual Achievable Potential by Residential End Use (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
App/Other	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.8	6.9
CrossCut/Behav	5.2	3.8	2.9	2.3	2.0	1.8	1.6	1.6	1.5	1.4	24.0
Heating/Ventil	6.3	6.5	6.8	7.1	7.4	7.7	8.0	8.2	8.4	8.6	74.9
Water Heat	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	24.4
Total	14.5	13.3	12.7	12.5	12.5	12.6	12.8	13.0	13.1	13.3	130.3

Source: Navigant analysis, 2014

The gas achievable potential broken out by low income end use is provided in Figure 5-15 and Table 5-12.

Figure 5-15: Gas Savings Achievable Potential by Low Income End Use in 2024



Source: Navigant analysis, 2014

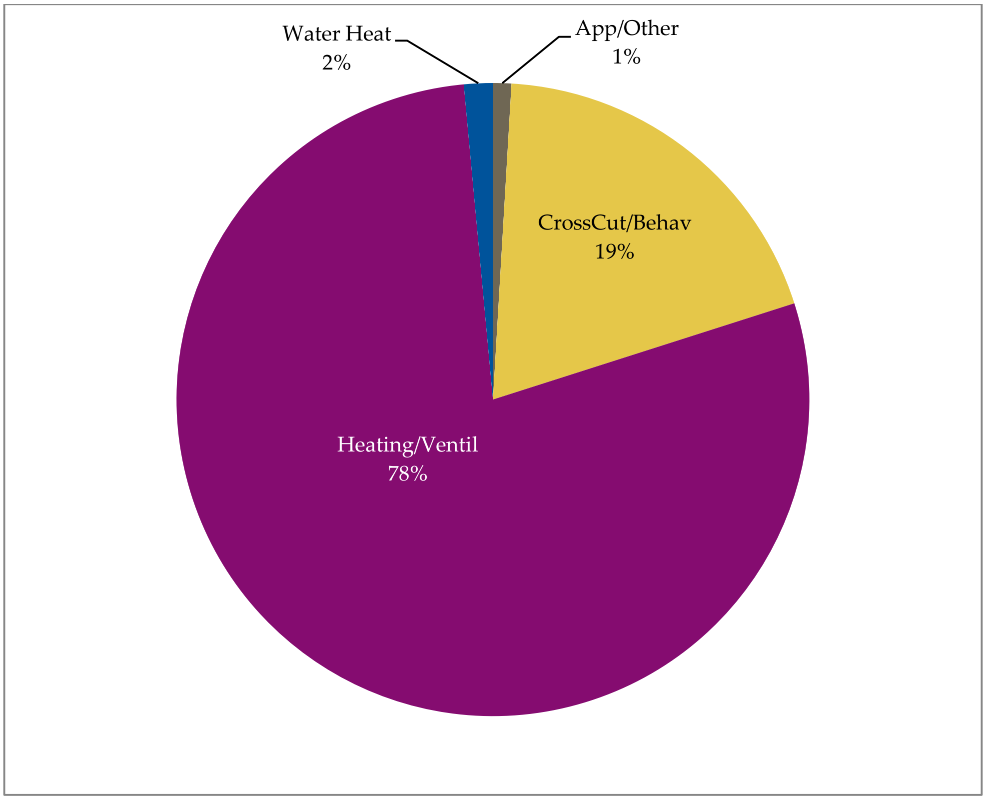
Table 5-12: Gas Savings Annual Achievable Potential by Low Income End Use (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
CrossCut/Behav	1.7	1.2	0.8	0.6	0.5	0.4	0.3	0.3	0.2	0.2	6.2
Heating/Ventil	2.4	2.6	2.7	2.9	3.1	3.2	3.4	3.5	3.6	3.7	31.1
Water Heat	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	6.4
Total	4.8	4.4	4.2	4.1	4.2	4.2	4.3	4.4	4.5	4.6	43.7

Source: Navigant analysis, 2014

Figure 5-16 and Table 5-13 present the gas achievable potential summarized by commercial end use category.

Figure 5-16: Gas Savings Achievable Potential by Commercial End Use in 2024



Source: Navigant analysis, 2014

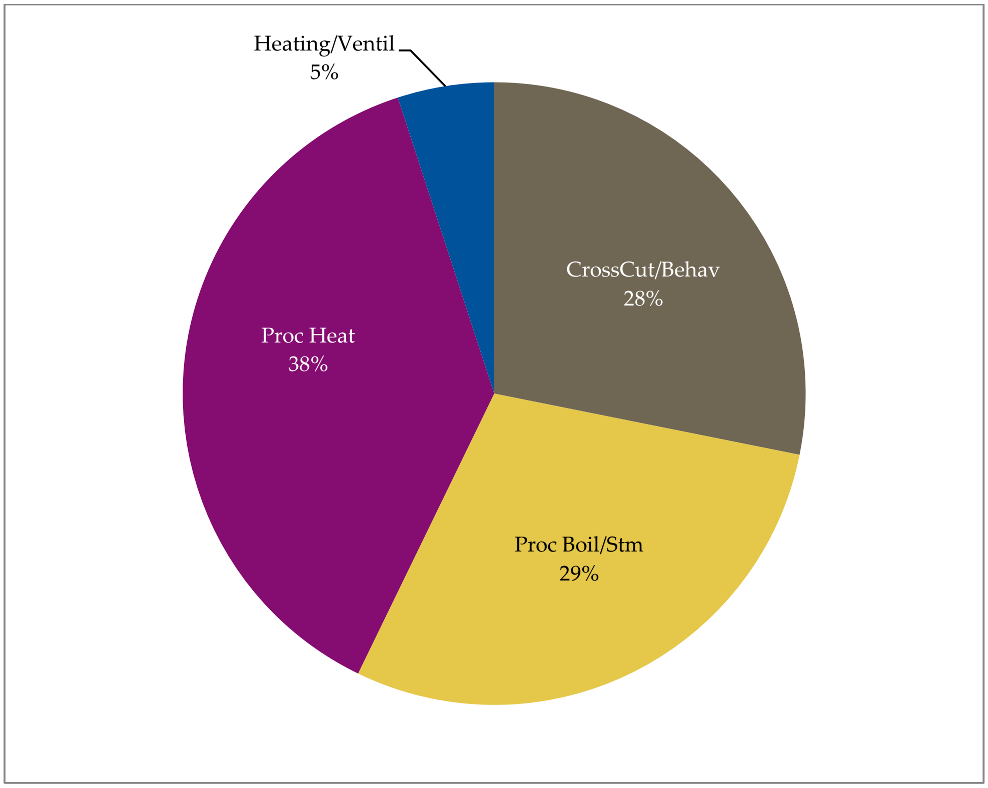
Table 5-13: Gas Savings Annual Achievable Potential by Commercial End Use (million m³/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
App/Other	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	4.1
CrossCut/Behav	7.9	8.1	8.4	8.5	8.6	8.7	8.7	8.5	8.4	8.1	83.9
Heating/Ventil	34.0	34.2	34.2	34.7	35.0	35.0	34.8	34.4	33.9	33.3	343.6
Water Heat	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.6	0.6	0.6	6.4
Total	43.1	43.5	43.7	44.3	44.7	44.8	44.5	44.0	43.2	42.4	438.1

Source: Navigant analysis, 2014

The gas achievable potential broken out by industrial end use is provided in Figure 5-17 and Table 5-14.

Figure 5-17: Gas Savings Achievable Potential by Industrial End Use in 2024



Source: Navigant analysis, 2014

Table 5-14: Gas Savings Annual Achievable Potential by Industrial End Use (million m³/year)

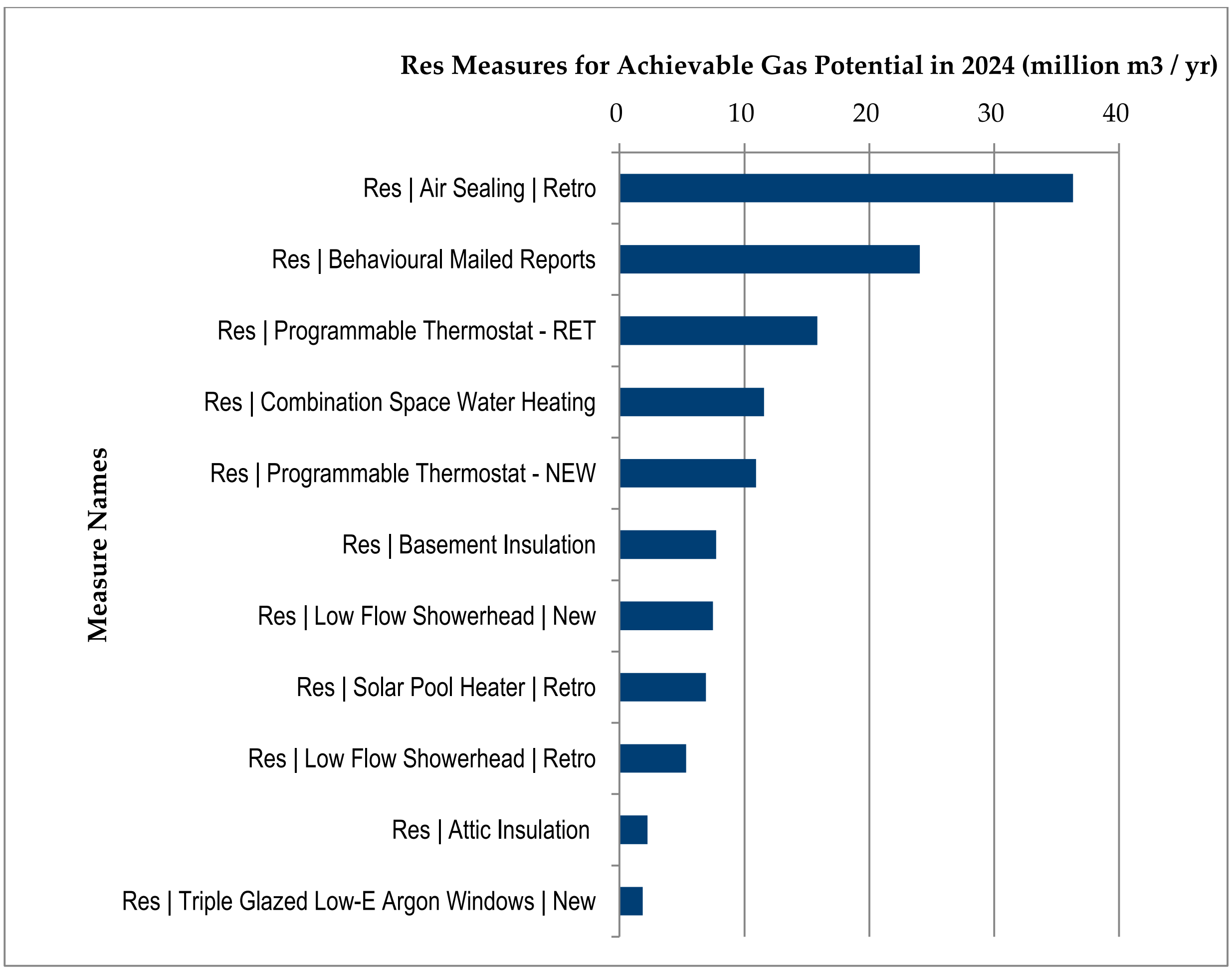
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
CrossCut/Behav	8.0	8.2	8.3	8.5	8.7	8.9	9.0	9.0	9.0	9.2	86.8
Proc Boil/Stm	8.4	8.6	8.7	8.9	9.1	9.2	9.2	9.2	9.2	9.2	89.6
Proc Heat	10.8	11.0	11.3	11.5	11.8	11.9	12.0	12.0	11.9	12.3	116.6
Heating/Ventil	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.7	15.5
Total	28.7	29.2	29.7	30.5	31.1	31.5	31.7	31.8	31.8	32.4	308.4

Source: Navigant analysis, 2014

5.2.5 Results by Measure

Figure 5-18 shows the top ranking residential measures for gas achievable potential. Basement insulation, the first-ranked measure in economic potential, moved down to the sixth largest measure in terms of achievable potential since savings from this measure are comparatively costly. In contrast, air sealing, the second largest economic potential measure, moves to the highest potential saver in achievable potential terms, owing to its low cost of savings (and therefore high incentive fractions and adoption levels). Behavioural mailed reports are the second largest achievable potential measure, despite being the eighth largest in terms of economic potential, since they are relatively low cost and not constrained by any equipment turnover. Tripled-glazed, low-E, argon windows, a measure that contributed appreciably to residential economic potential, has a reduced role in achievable potential because it is a ROB measure with a long thirty-year life, meaning that slow stock turnover limits its potential.

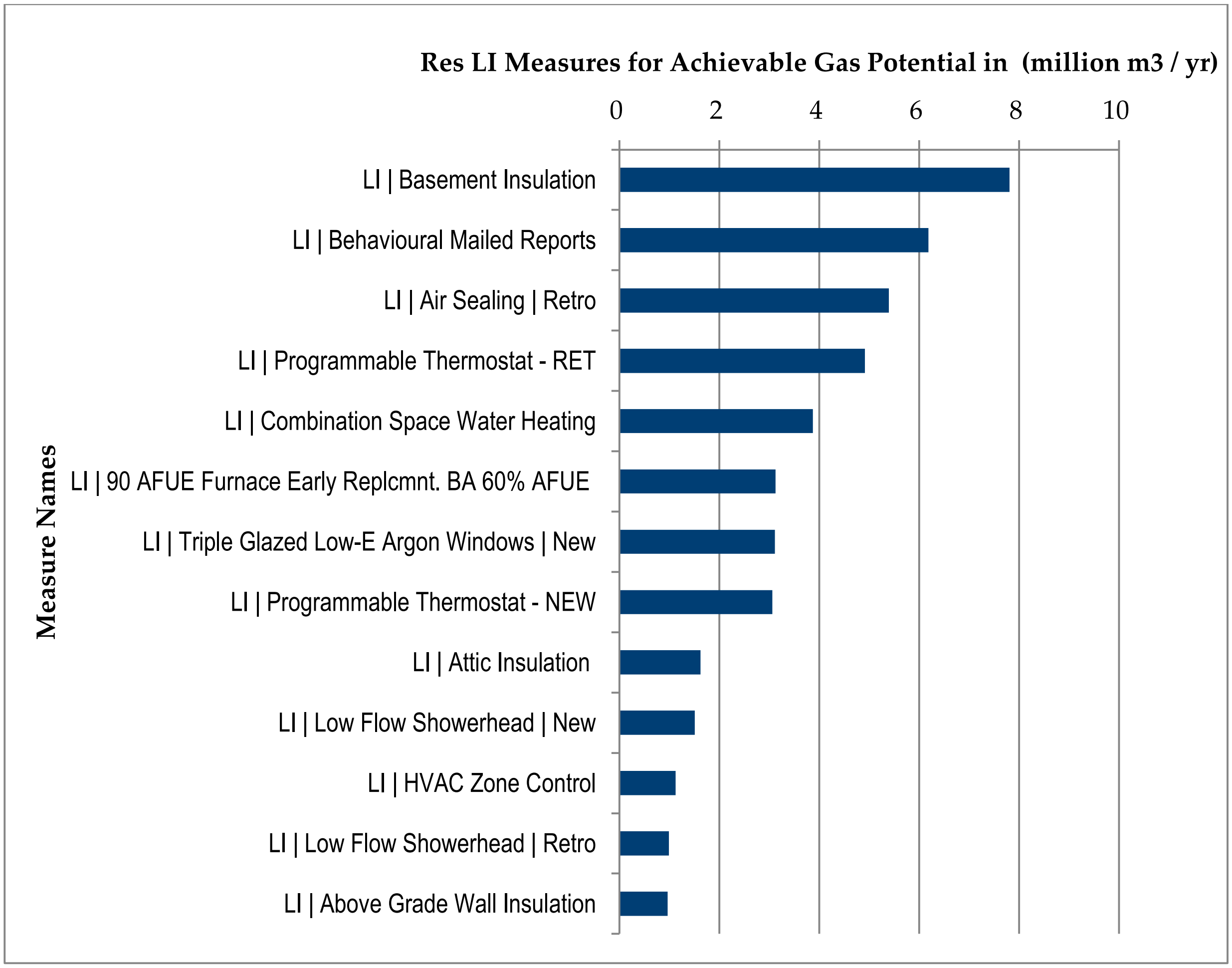
Figure 5-18: Top Residential Measures for Gas Savings Achievable Potential (million m³/year)



Source: Navigant analysis, 2014

Figure 5-19 gives the rankings and achievable potential for the highest-impact low income measures. The top ranking low income measures for achievable potential are similar to the residential sector. However, "90 AFUE furnace early replacements" and "HVAC zone control" appear in the low income sector because of this sector's lower threshold for cost effectiveness.

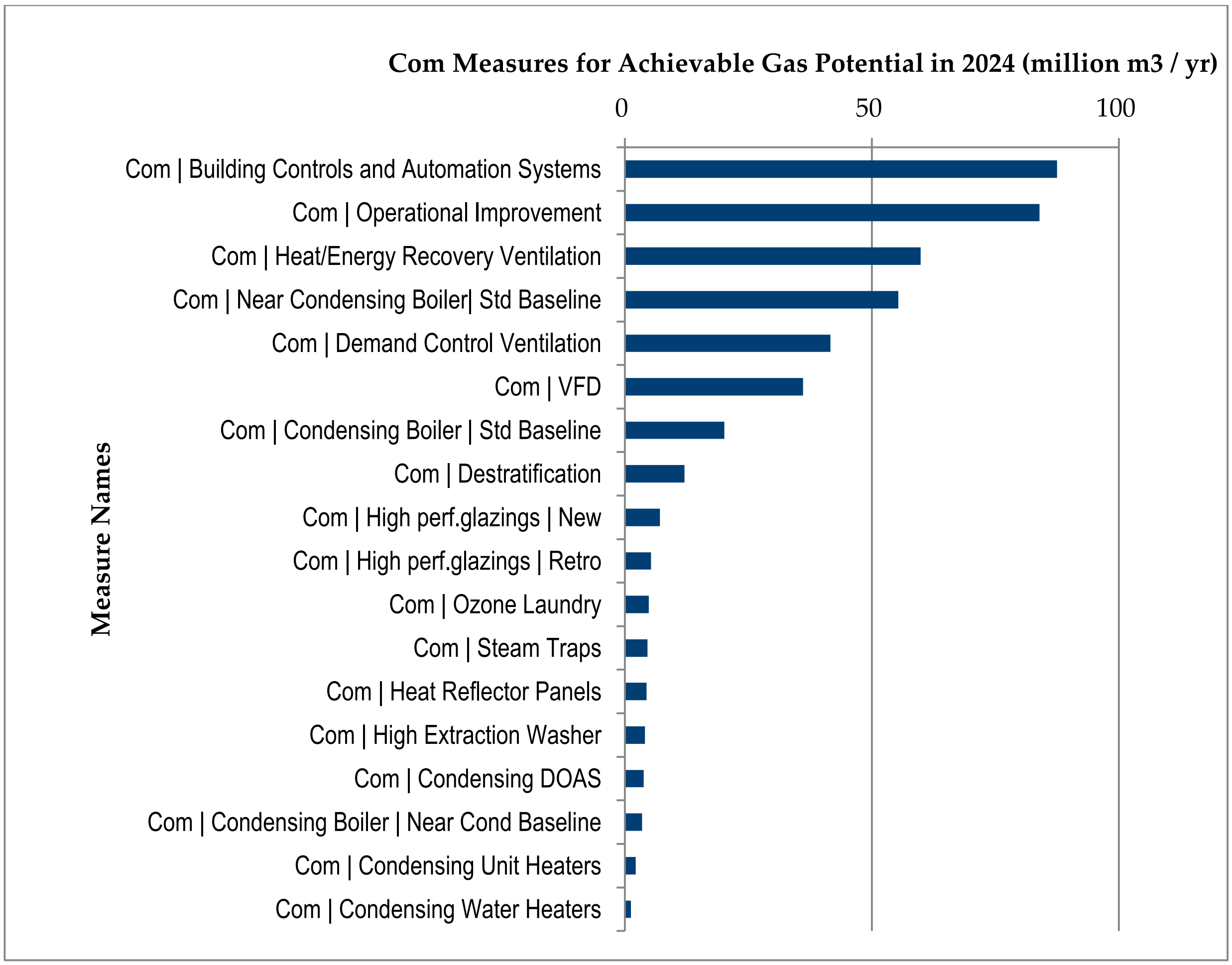
Figure 5-19: Top Low Income Measures for Gas Savings Achievable Potential (million m³/year)



Source: Navigant analysis, 2014

Figure 5-20 shows the top commercial measures ranked in order of their achievable potential. The top five commercial measures in terms of achievable potential all had payback times (after incentives) ranging from 0.5 to 4.2 years, which led to appreciable adoption. Condensing boilers and high performance glazing, the first- and sixth-ranked measures in terms of economic potential, gained little market share in the achievable scenario due to their relative cost of savings and longer payback times after incentives.

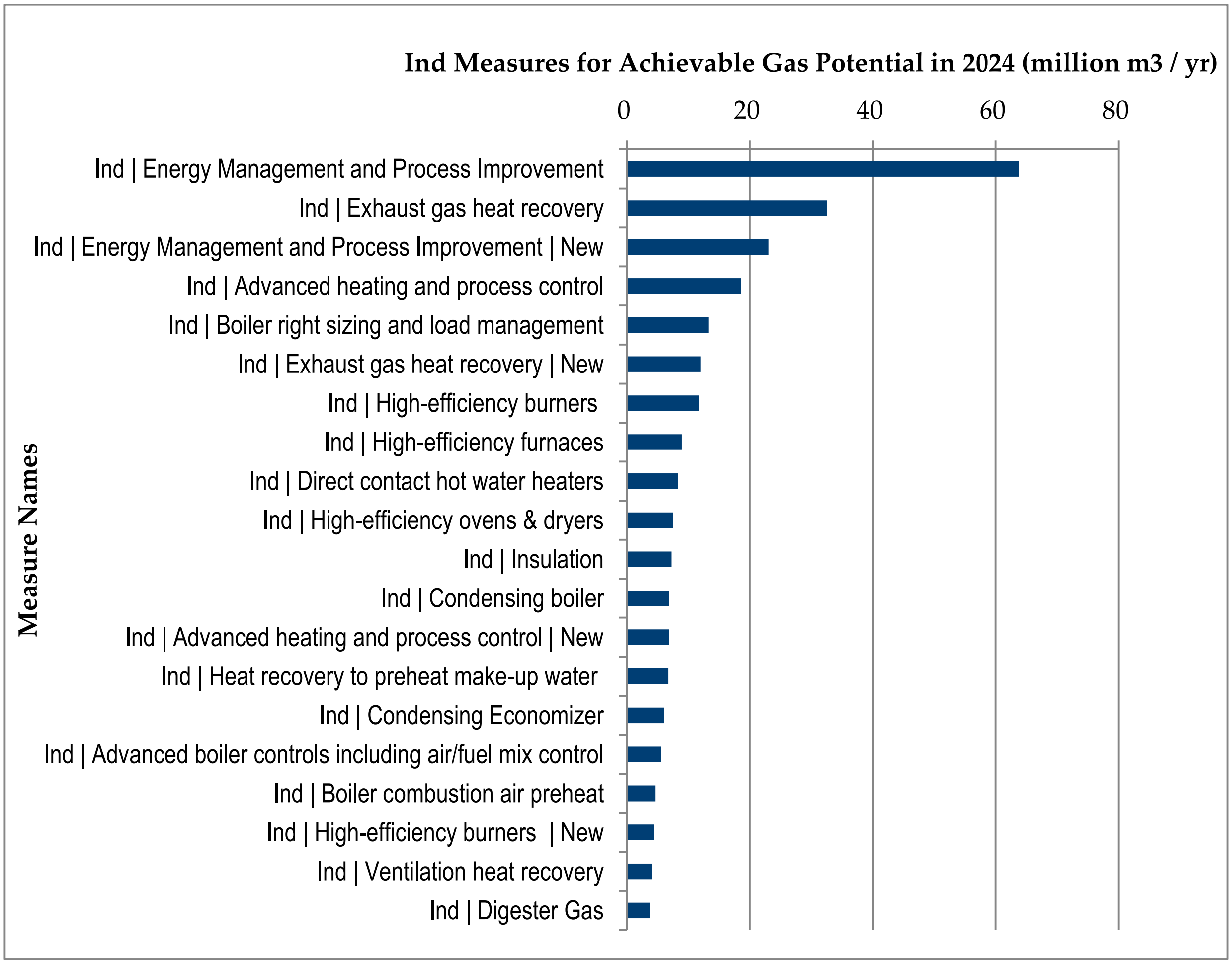
Figure 5-20: Top Commercial Measures for Gas Savings Achievable Potential (million m³/year)



Source: Navigant analysis, 2014

The industrial measures with the highest achievable savings potential are given in Figure 5-21. The industrial measures with the largest achievable potential do not differ greatly from the economic potential. The reason is that these high-impact industrial measures are all relatively low cost and therefore have short payback times after incentives. Energy management and process improvement is the top-ranked measure for both the economic and achievable scenarios.

Figure 5-21: Top Industrial Measures for Gas Savings Achievable Potential (million m³/year)



Source: Navigant analysis, 2014

5.3 *Achievable Potential Budget Estimates*

This section provides Navigant's estimate of the budget levels required to achieve the base case savings forecast. We first describe our approach to budget estimation. Then, we provide estimates of the budgets over time at the sector and portfolio levels. We conclude with a discussion of the cost effectiveness of achievable savings, over time, at the sector and portfolio levels.

5.3.1 Approach to Budget Estimation

Navigant estimated incentive costs and administrative costs for the base case scenario for each sector and for the portfolio as a whole. Incentive cost estimates are derived from the model using the forecast of measures adopted multiplied by the incentive level for that measure (see Section 5.1.6 for discussion on incentive values used for the base case). Administrative costs[31] were estimated by Navigant based on historical cost data provided by Enbridge. To forecast changes to administrative costs that are likely to occur with increases or decreases in forecast savings, administrative costs were broken into an assumed "fixed" portfolio administrative cost (i.e., costs that are not forecast to scale materially with savings achieved, including market transformation activities), and "variable" administrative costs. Historical average administrative costs over the last four years were used to estimate the values shown in Table 5-15. See Table 5-15 for portfolio administration and market transformation cost assumptions.

Table 5-15. Assumed Administrative Costs

Cost Type	Cost
Residential	$0.029 ($ / sector m3 / year)
Commercial	$0.027 ($ / sector m3 / year)
Industrial	$0.024 ($ / sector m3 / year)
Low Income	$0.099 ($ / sector m3 / year)

Source: Navigant, 2014, estimates based on historical Enbridge cost data.

5.3.2 Total Achievable Potential Budget

The annual budgets calculated by the DSMSim model for the base case achievable scenario are broken out by incentive costs and administrative costs for each sector and for the portfolio in Table 5-16. These budget figures include portfolio-level administrative costs as well as market transformation costs (values for market transformation estimates provided by Enbridge). The 2015 total budget is close to Enbridge's current energy efficiency budget of $32 million. The average annual budget across the ten-year period is roughly $35 million for the base case scenario, with incentives accounting for 73 percent and administrative costs accounting for 27 percent of the total, on average.

[31] All non-incentive costs are referred to as administrative costs in this report, and may include program design, training, implementation, measurement and verification, marketing, market transformation, etc.

Table 5-16. Budgets for Base Case Achievable Potential ($1000s/year)

Program	Budget Type	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Residential	Incentives	4,260	3,804	3,553	3,454	3,424	3,426	3,442	3,473	3,509	3,547
	Admin.	420	393	382	385	393	404	418	432	447	462
	Sub-Total	4,680	4,197	3,935	3,838	3,817	3,830	3,860	3,905	3,956	4,009
Low Income	Incentives	7,262	7,269	7,415	7,663	7,938	8,239	8,555	8,883	9,209	9,529
	Admin.	473	442	433	436	446	461	480	500	521	542
	Sub-Total	7,735	7,711	7,848	8,099	8,385	8,700	9,035	9,383	9,730	10,071
Commercial	Incentives	6,245	6,314	6,343	6,434	6,501	6,511	6,472	6,405	6,308	6,188
	Admin.	1,163	1,198	1,228	1,269	1,307	1,334	1,352	1,363	1,368	1,367
	Sub-Total	7,408	7,513	7,570	7,703	7,808	7,845	7,823	7,768	7,676	7,555
Industrial	Incentives	1,708	1,744	1,781	1,830	1,876	1,908	1,925	1,935	1,936	1,985
	Admin.	688	715	742	776	808	836	858	877	893	931
	Sub-Total	2,396	2,459	2,523	2,606	2,685	2,744	2,782	2,812	2,829	2,916
Market Transformation*	Incentives	4,400	4,610	4,848	5,119	5,396	5,645	5,856	6,044	6,204	6,409
	Admin.	460	486	512	545	579	610	639	666	691	712
	Total	4,860	5,096	5,360	5,664	5,975	6,255	6,495	6,710	6,895	7,121
Portfolio Totals	Incentives	23,876	23,742	23,940	24,500	25,136	25,729	26,250	26,739	27,167	27,658
	Admin.**	9,227	9,219	9,238	9,312	9,395	9,487	9,594	9,713	9,842	9,969
	*Total****	33,103	32,960	33,178	33,812	34,531	35,216	35,844	36,453	37,009	37,627

* Base case market transformation estimates were provided by Enbridge.
** Total administration costs include portfolio-level administrative costs in addition to the program-specific administrative costs
*** Breakdown of portfolio admin, market transformation admin, and market transformation incentives are provided for illustration of the base case only. For other scenarios, the combination of these three cost streams were modelled as a $7.9 million/year fixed cost with a $0.033/m^3 variable cost.

Source: Navigant analysis, 2014.

5.3.3 Cost Effectiveness

The TRC ratios derived from the base case achievable scenario are shown by sector and for the portfolio in Table 5-17. As seen below, the industrial sector is the most cost effective, with TRCs ranging from 7.3 to 7.6 over the study period, driven largely by the low-cost energy management and process improvement measure, the largest saver in the industrial sector. The overall portfolio is also highly cost effective, with benefits exceeding costs by a factor ranging from 3.5 to 3.7.

Table 5-17. Total Resource Cost Benefit/Cost Test Ratios

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Residential	2.9	3.0	3.1	3.1	3.2	3.2	3.2	3.3	3.3	3.3
Low Income	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2
Commercial	2.6	2.7	2.7	2.7	2.7	2.6	2.6	2.5	2.5	2.5
Industrial	7.3	7.4	7.6	7.6	7.6	7.5	7.5	7.5	7.4	7.3
Portfolio	3.5	3.6	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.6

Source: Navigant analysis, 2014

Table 5-18 provides the net monetary benefits, which are the benefits net of the costs, calculated in the TRC test. These figures are premised on continued replacement of efficient measures with similar efficient measures, which is consistent with the use of first-year savings for the achievable potential.

Table 5-18. Total Resource Cost Test Net Benefits (million $)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total* (2015$)
Residential	133	137	143	150	157	162	167	173	178	184	1,128
Low Income	37	38	40	42	44	45	47	48	50	52	315
Commercial	278	295	308	322	332	332	333	333	331	329	2,297
Industrial	469	496	524	551	575	593	607	618	626	645	4,065
Portfolio	905	956	1,004	1,053	1,096	1,120	1,140	1,159	1,173	1,197	7,719

*The present value of net benefits over the ten-year study horizon

Source: Navigant analysis, 2014

5.4 *Achievable Potential Sensitivity Analysis*

This section provides the results of several sensitivity analyses on achievable potential.

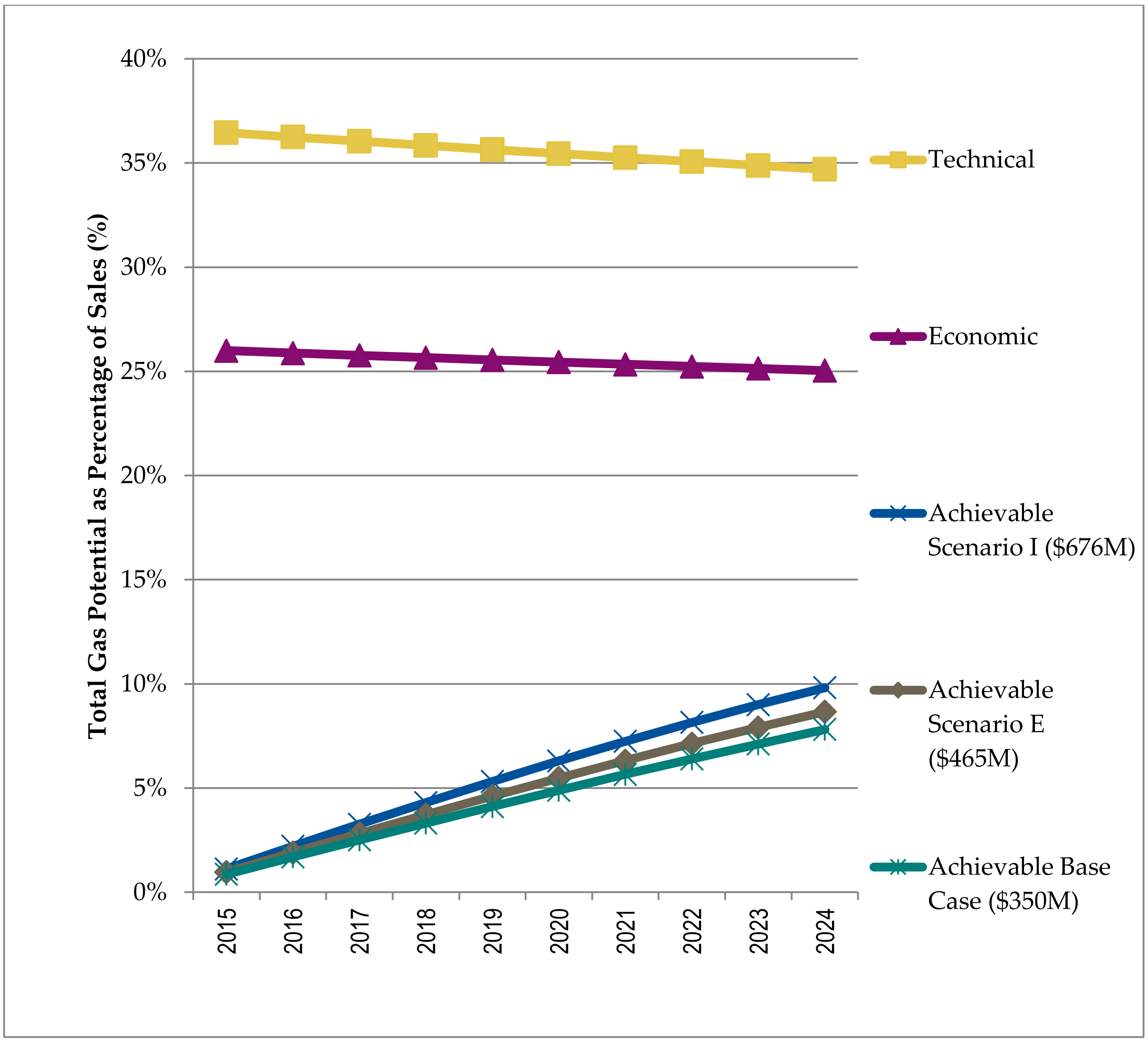
5.4.1 Budget Sensitivity

In addition to modelling the base case scenario, Navigant also modelled portfolio- and sector-level achievable potential and costs for eleven other budget scenarios. Increasing adoption of efficient technologies can be accomplished in a number of different ways. Often, potential studies simply increase the assumed level of incentives in conducting these sensitivity analyses. While this is certainly one way of increasing adoption, it is not the only way, and relying solely on increased incentives will tend to result in costly increases in achieved potential. Since Navigant's technology diffusion model includes other parameters beyond simple economics (e.g., marketing effectiveness), it has the ability to simulate increases in program participation from more aggressive program marketing as well. In this sensitivity analysis, Navigant increased both the assumed "marketing effectiveness" parameter of the diffusion logic in conjunction with an increase in incentives to provide a more realistic representation of the likely cost required to achieve increased savings.[32]

[32] More specifically, Navigant first increased the estimated marketing effectiveness parameter by 100%, up to a maximum of 0.06, a value deemed to be on the high end of the realistic values for this parameter (the 75th percentile of this parameter is 0.055 across many technologies -- See Mahajan, V., Muller, E., and Wind, Y. (2000). New Product Diffusion Models. Springer. Chapter 12). At the same time, Navigant increased the "threshold incentive value" for each sector by a multiplicative factor (up to 2X the base case value) until the output budgets spanned the desired range.

Results of this sensitivity analysis are provided in Figure 5-22 and Table 5-19, for results at the portfolio-level (including portfolio administrative costs), and in Table 5-20, for results at the sector level (exclusive of portfolio-level administrative costs).

Figure 5-22. Gas Savings Total Potential with Several Budget Scenarios (million m³/year)



Source: Navigant analysis, 2014

Table 5-19. Cumulative Budget[33] and Achievable Potential by Portfolio Budget Scenario in 2024

Scenario	Budget ($ million)	Savings (million m3/yr)	% of 2024 Gas Sales	Avg. TRC Ratio (2015-2024)	TRC Net Benefits* (billion 2015$)
A	312	882	7.5%	3.7	7.46
Base Case	350	920	7.8%	3.6	7.72
C	385	954	8.1%	3.6	7.94
D	424	987	8.4%	3.5	8.15
E	465	1,021	8.7%	3.5	8.36
F	510	1,055	9.0%	3.4	8.57
G	562	1,089	9.2%	3.4	8.76
H	618	1,123	9.5%	3.3	8.95
I	676	1,156	9.8%	3.3	9.15
J	827	1,197	10.2%	3.2	9.37
K	1,241	1,305	11.1%	3.0	9.96
L	1,700	1,414	12.0%	2.8	10.46

*The present value of net benefits over the ten-year study horizon

Source: Navigant analysis, 2014

[33] The base case budget corresponds with an average budget level over ten years ($35 million) equal to that if a starting budget of $32 million were increased at 2%/year inflation for 10 years (per the RFP). However, the actual budget simulated is not constrained precisely by the 2%/year increase, since budgets are an output of the model, not an input.

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

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

* Excludes portfolio-level administrative costs

Source: Navigant analysis, 2014

5.4.2 TRC Screening Threshold Sensitivity

As requested by Enbridge, Navigant explored several approaches aimed at increasing cumulative cubic meters (CCM) potential, which is the first-year gas savings potential of each measure multiplied by the measure's lifetime. The first approach adjusted the incentives levels on a levelized $/m³ basis, while keeping the cumulative 10-year budget equivalent to the base case ($350 million). Adjusting the incentives levels to maximize CCM led to an increase of 0.27 percent in total CCM (2015 through 2024). This modest increase in total CCM was expected because incentivizing measures on a levelized $/m³ basis already tends to favor measures with high CCM savings potential. The second approach allowed non-cost-effective, but high-CCM, measures to be considered in the market adoption routines, while using the same incentive approach as the base case. This method was not able to provide higher CCM potential at equivalent cost to the base case, and increases in CCM were only achieved at considerable cost. To supplement the insights gained from these results, Navigant performed an additional sensitivity analysis, discussed below, that investigate the TRC screening threshold's impact on savings and budgets.

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

As expected, relaxing the TRC screening threshold caused achievable gas savings and budgets to increase, while TRC ratios decreased. Although TRC ratios decreased, the portfolio and sectors remained cost-effective (meaning the TRC was greater than or equal to 0.7 in the low income sector and 1.0 in all other sectors) for all budget scenarios. Table 5-21 shows the average portfolio-level TRC over the ten-year study horizon for each of the budget scenarios. Relative to the results in Section 5.4.1, budget increases ranged from 6 percent (Scenario A) to 25 percent (Scenario I), while gas savings increases ranged from 2 percent (Scenario A) to 7 percent (Scenario I). In other words, relaxing the TRC screening threshold leads to a higher cost per m^3 of gas savings.

Table 5-21. Cumulative (10-year) Budget, Achievable Potential, and Average TRC Ratio by Budget Scenario[34]

Scenario	Budget ($ million)	Savings (million m3/yr)	% of 2024 Gas Sales	Avg. TRC (2015-2024)	TRC Net Benefits* (billion 2015$)
A	329	902	7.7%	3.5	7.38
Base Case	376	945	8.0%	3.4	7.62
C	422	983	8.3%	3.4	7.82
D	476	1,022	8.7%	3.3	8.01
E	536	1,061	9.0%	3.2	8.19
F	605	1,101	9.3%	3.1	8.36
G	675	1,140	9.7%	3.1	8.53
H	749	1,179	10.0%	3.0	8.70
I	820	1,216	10.3%	2.9	8.87
J	1,063	1,267	10.8%	2.8	8.94
K	1,601	1,389	11.8%	2.5	9.27
L	2,128	1,516	12.9%	2.3	9.66

*The present value of net benefits over the ten-year study horizon
Source: Navigant analysis, 2014

5.4.3 Peak Day Demand Sensitivity Analysis

This section first presents the peak day gas demand savings potential for the base case achievable scenario and then provides a sensitivity analysis of peak gas demand savings to different incentive strategies and budget levels.

Table 5-22 shows the annual peak day gas demand potential for the "base case" achievable scenario (i.e., the $35 million average annual budget scenario), which reduces peak gas demand by 7.8 million m^3/day by 2024. These results are based on an incentive strategy that awards incentives based on the levelized cost of gas energy ($/m^3), as is described in Section 5.1.6.

[34] Scenarios A through I used incentive levels (in levelized $/m^3) identical to the scenarios described in Section 5.4.1, while Scenarios J through K employed incentive levels that would produce 2015 budgets of $100 million, $150 million and $200 million, respectively. The budgets for Scenarios A through I do not match those outlined in Section 5.4.1 because the TRC screening threshold has been reduced in this sensitivity analysis.

Table 5-22. Peak Day Gas Demand Annual Achievable Potential by Sector (thousand m^3/day/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Residential	130	118	112	110	110	111	113	115	117	118	1,154
Low Income	41	37	35	34	34	35	35	36	37	38	363
Commercial	472	478	480	486	491	492	488	483	475	466	4,811
Industrial	136	139	141	145	148	150	151	152	152	155	1,468
Total	780	771	768	775	783	788	788	786	781	777	7,797

Source: Navigant analysis, 2014

Awarding incentives based on a levelized cost of peak gas *demand* ($/m³/day), rather than on a levelized cost of gas *energy* ($/m³), is an alternative incentive strategy that can maximize peak gas demand savings. Navigant explored this alternative incentive strategy for multiple budget levels. A comparison of results between the two strategies is shown in Table 5-23. To facilitate comparison of the different incentive strategies, for various budget scenarios, Navigant calibrated the model to result in the same peak demand reduction for what we are calling the "base case" for both a "demand based incentive" and an "energy based incentive" budget strategy.

The comparison shows that an incentive strategy based on the levelized cost of peak gas demand can, on average, achieve similar peak gas demand savings at lower budget levels. This result stems from slightly different incentive values and adoption levels of measures due to their differing costs to reduce peak demand ($/m³/day). However, we do note that in general, the order of the top measures is not appreciably changed when the incentive strategy focuses on peak demand. This result indicates that, while subtle changes to incentives can offer comparable peak demand reduction at lower cost, program design approaches (other than incentive levels) would not have to be materially changed to effect this outcome.

Table 5-23. Cumulative Budgets and Peak Gas Demand Achievable Potential by Incentive Strategy and Budget Scenario

Scenario	Demand-Based Incentives		Energy-Based Incentives	
	Budget ($ million)	Demand Savings (million m3/day)	Budget ($ million)	Demand Savings (million m3/day)
A	296	7.5	312	7.5
Base Case	342	7.8	350	7.8
C	388	8.1	385	8.1
D	428	8.4	424	8.4
E	461	8.7	465	8.7
F	495	9.0	510	9.0
G	530	9.3	562	9.2
H	566	9.6	618	9.5
I	602	9.8	676	9.8
J	736	10.2	827	10.1
K	1,083	11.0	1,241	11.0
L	1,432	11.7	1,700	11.8

Source: Navigant analysis, 2014

5.4.4 Avoided Distribution Cost and Non-Energy Benefit Sensitivity Analysis

In Section 4.3, we provide the gas savings economic potential from avoided distribution cost and non-energy benefits sensitivity analyses, which increased economic potential by roughly 0.5 percent and 3 percent, respectively. Because the individual impact on economic potential from these sensitivity analyses was small, we have combined them for a single sensitivity analysis on achievable potential. To provide an apples-to-apples comparison, we calibrated the incentive structure in this scenario to produce a trajectory having the same cumulative budget ($350 million over 10 years) as the base case scenario. Table 5-24 shows that the inclusion of avoided distribution costs and non-energy benefits, which increase the weighted average avoided costs by nearly 16 percent in 2015, result in an increase in the total 2024 achievable potential of 13 million m^3/year, or about 1.4 percent. Table 5-25 provides the budget breakdown associated with this sensitivity analysis.

Table 5-24. Gas Savings Annual Achievable Potential when Considering Avoided Distribution Costs and Non-Energy Benefits (million m^3/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Residential	14	13	14	14	14	14	14	14	14	15	139
Low Income	5	4	4	4	4	4	4	4	5	5	44
Commercial	43	43	44	44	45	45	44	44	43	42	437
Industrial	29	29	30	31	32	32	32	32	32	33	313
Total	91	90	91	93	94	95	95	95	95	95	933

Source: Navigant analysis, 2014

Table 5-25. Budget when Considering Avoided Distribution Costs and Non-Energy Benefits (million $/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Incentives	18.9	18.6	18.9	19.3	19.7	20.1	20.4	20.7	21.0	21.3	150.5
Administration	13.6	13.8	14.1	14.5	14.9	15.3	15.6	15.9	16.2	16.5	199.1
Total	32.5	32.4	33.1	33.8	34.6	35.4	36.0	36.6	37.2	37.8	349.6

Source: Navigant analysis, 2014

5.5 *Comparison with Prior Potential Study*

In September of 2009 Marbek Resource Consultants released a report[35] describing its gas savings potential analysis of the Enbridge service territory. The report estimated the economic potential and achievable potential over the 10-year period from 2008 to 2017. In this section, we compare the results of this study with the results of the 2008 study from two different perspectives. First, we compare the "end of study" economic and achievable potential in years 2017 and 2024 for the Marbek and Navigant studies, respectively. Next, we compare the incremental annual achievable potential in milestone year 2017.

Before making this comparison, it is important to note that a number of factors make it highly unlikely that the results of these two studies would be equal, including, but not limited to the following.

» Avoided gas supply costs (used in screening for cost effectiveness) were between 36% and 42% higher in the Marbek study in the year 2017 than in this study, owing to the fact that natural gas prices have decreased substantially in recent years.

» Significant methodological differences exist between the two studies, particularly with respect to the forecast adoption of efficient measures over the study period, as well as differences in how incentive levels are prescribed for each scenario.

Several different budget scenarios were run in each of the two studies, though the scenarios analyzed differ somewhat. To provide the most directly comparable results, we chose the "$40 million annually" scenario from the Marbek study and compared it with this study's "Budget Scenario C," which has an average spending level of $41.5 million over the 10-year study horizon. The results of this comparison are shown below in Table 5-26. As can be seen in this figure, overall gas savings as a percentage of gas sales is about 11% in the Marbek study and about 8.1% in this study, though differences are somewhat greater when comparing sector-level results. These levels correspond with an average annual savings of 1.1%/year and 0.81%/year for the Marbek and Navigant studies, respectively. This degree of savings from the Marbek study is considered to be on the high end of the range of savings achieved in other jurisdictions studied by Navigant, suggesting that the overall results of this study are likely realistic. Limited measure-specific results at the sector level in the Marbek study precluded a more detailed

[35] "Natural Gas Energy Efficiency Potential: Update 2008. Residential, Commercial and Industrial Sectors Synthesis Report." Marbek Resource Consultants. September 2009.

comparison and identification of the drivers of study differences, though we do note that lower gas prices should a) cause fewer measures to be cost effective than in the Marbek study, and b) cause payback times for a given level of incentives to be longer in this study than in the Marbek study, which is a likely contributor to lower achievable potential estimates.

Table 5-26. Comparison of End of Study Cumulative Achievable and Economic Potential Savings

	Navigant (2024)	Marbek (2017) $40M scenario	Navigant (2024), Budget Scenario C ($41.5M average spending)	Marbek (2017) $40M scenario
Type	**Economic**	**Economic**	**Achievable**	**Achievable**
Residential	19%	18%*	4%	6%*
Low Income	24%		7%	
Commercial	25%	29%	8%	15%
Industrial	36%	34%	15%	15%
All	**25%**	**26%**	**8%**	**11%**

* The Marbek study lumped low income potential with overall residential results.

Source: Navigant Consulting, Inc. and "Natural Gas Energy Efficiency Potential: Update 2008. Residential, Commercial and Industrial Sectors Synthesis Report." Marbek Resource Consultants. September 2009.

A comparison of the estimated incremental annual achievable potential in milestone year 2017 (i.e., the achievable potential only in 2017, not including any potential acquired prior to that year) is provided below in Table 5-27. Overall, the forecast incremental annual savings in 2017 across all sectors is about 34% lower in this study than in the Marbek study. Though, this difference in the annual achievable savings is reduced to about 27% when looking at the cumulative savings at the end of the study period (likely due to different estimations in the rate of measure adoption over time). As previously noted, limited measure-specific results at the sector level in the Marbek study precluded a more detailed comparison and identification of the drivers of study differences.

Table 5-27. Comparison of Incremental Annual Achievable Potential in 2017

	Incremental Achievable Potential in 2017 Only (million m3)	
	Navigant Budget Scenario C ($39.8M spending in 2017)	**Marbek $40M annually scenario**
Residential	14	27*
Low Income	5	
Commercial	45	67
Industrial	30	48
Total	**94**	**142**

Source: Navigant Consulting, Inc. and "Natural Gas Energy Efficiency Potential: Update 2008. Residential, Commercial and Industrial Sectors Synthesis Report." Marbek Resource Consultants. September 2009

Comparison with Actual Enbridge Savings in 2012

Navigant compared forecast achievable potential from the Marbek potential study with actual savings achieved by Enbridge in 2012. The Marbek study provides supply curves showing annual budgets as a function of forecast incremental annual achievable savings for the residential and commercial sectors. Navigant interpolated these supply curves to find the forecast savings corresponding with the actual budget levels in 2012 for these two sectors. Forecast incremental annual potential in 2012 was not provided by the Marbek study, so averages over the 5-year period from 2008-2012 were used as an estimate of the annual achievable potential in 2012. The forecast potential for a given budget is compared with actual savings achieved and actual budgets in Table 5-28.

Table 5-28. Comparison of Marbek 2012 Achievable Potential Forecasts with Actual Savings

	Marbek		Actual[5]		Percent Difference	
	Budget[4] (million $/yr)	Savings (million m3/yr)	Budget[4] (million $/yr)	Savings (million m3/yr)	Budget (%)	Savings (%)
Residential[1]	8.7	28.3	8.7	11.3	0%	-60%
Commercial[2]	9.3	56.7	9.3	45.2	0%	-20%
Industrial[3]	4.0	34.2	2.6	36.0	-35%	5%
Total	22.0	119.3	20.6	92.5	-6%	-22%

[1]Marbek residential values were interpolated, based on actual budget values, from supply curve results shown in Exhibit 6.15 of the Marbek Residential Report.[36]
[2]Marbek commercial values were interpolated, based on actual budget values, from supply curve results shown in Exhibit 6.16 of the Marbek Commercial Report.[37]
[3]Marbek industrial values are annual averages over the 5-year period from 2008-2012 shown in Exhibit 5.3 of the Marbek Synthesis Report.[38]
[4]Budgets include incentives and administrative costs, while excluding portfolio-level admin and market transformation costs.
5Actual values were provided by Enbridge, and low income costs have been lumped in with the residential or commercial sectors depending on their designation.

Source: Marbek 2009 Potential Study, Enbridge Data

Enbridge actuals for residential were roughly 60% lower in 2012 than the Marbek study estimated to be achievable.[39] Low-flow showerheads provided the greatest savings for the residential sector in both the Marbek study (7.23 million m^3/year) and the actual program results (6.24 million m^3/year). However, programmable thermostats, efficient dishwashers, high-performance windows, and other measures that showed significant achievable potential in the Marbek study were not found in 2012 Enbridge program actuals (though some of these savings, such as for windows, may be reflected in Enbridge's New Construction Energy Star Houses measure), a contributing factor in Marbek's higher achievable savings forecast for that sector.

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[36] "Natural Gas Energy Efficiency Potential: Update 2008. Commercial Sector Report." Marbek Resource Consultants, May 2009.

[37] "Natural Gas Energy Efficiency Potential: Update 2008. Residential Sector Report." Marbek Resource Consultants, May 2009.

[38] "Natural Gas Energy Efficiency Potential: Update 2008. Residential, Commercial and Industrial Sectors Synthesis Report. Marbek Resource Consultants. September 2009.

[39] Note that the Marbek study did not separate out Low Income savings. Low income actuals for Enbridge are provided by Commercial and Residential and are included here in their respective sectors.

Enbridge 2012 actuals for the commercial sector were roughly 20% lower than estimated to be achievable in the Marbek study. The Marbek study estimated that "space heating/other – recommissioning" would provide the greatest annual achievable potential (31.3 million m^3/year) in 2012, whereas building controls provided the greatest savings (8.87 million m^3/year) in Enbridge program actuals. More detailed comparisons between Marbek's and Enbridge's measure lists are precluded due to different naming conventions.

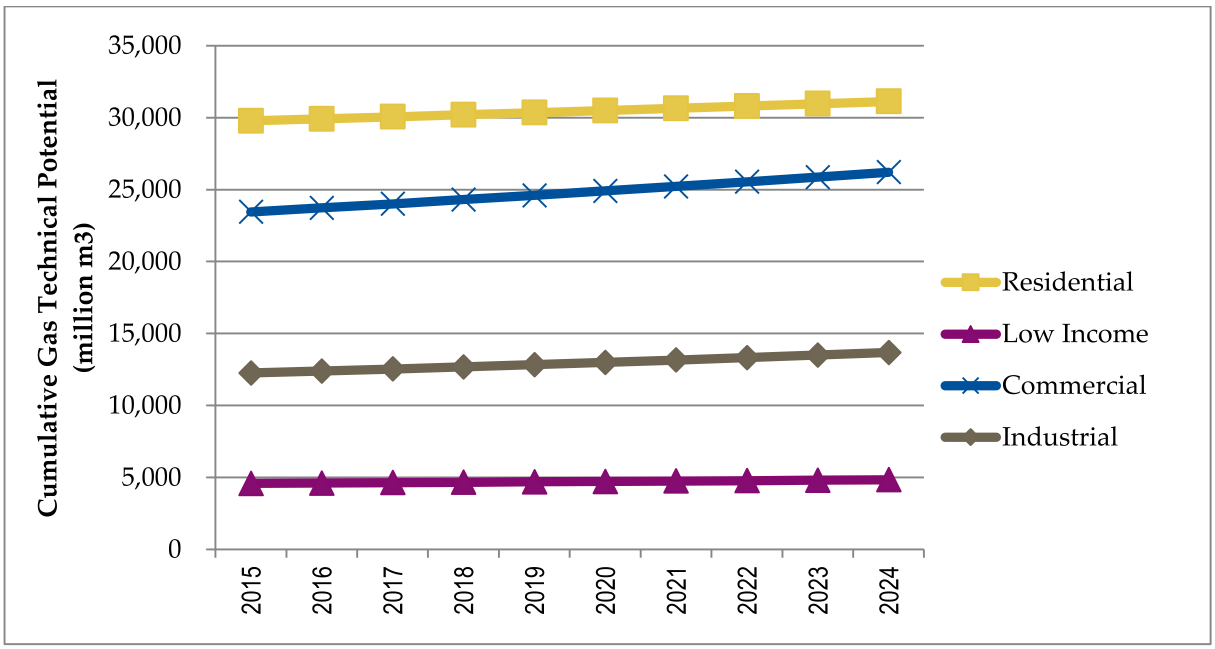
Comparison for the industrial sector is more difficult since incremental annual values were not explicitly provided for 2012 in the Marbek study. The Marbek study estimated that *average* annual savings of 34.3 million m^3/year could be achieved at budget levels of $4.0 million/year in the years prior to and including 2012. It should be noted that the actual budget for industrial was $2.6 million in 2012, so it is likely that Marbek's estimated achievable potential for the industrial sector would be lower at a reduced budgets. Measure-level industrial data were not provided in the Marbek report, precluding a more rigorous comparison.

Appendix A Supplemental Results

This appendix includes supplemental results generated by the DSMSim model. As with the main body of the report, all results in this Appendix are Gross savings.

Showing the gas energy savings potential multiplied by the lifetime of each measure and aggregating measures based on their applicable sector gives a useful perspective on the cumulative savings that are expected over the lifetime of each measure. Figure A-1 and Table A-1 provide the cumulative technical gas energy savings potential; Figure A-2 and Table A-2 show the cumulative economic gas savings potential; and Figure A-3 and Table A-3 show the cumulative achievable gas savings.

Figure A-1. Cumulative Gas Savings Technical Potential (cumulative million m^3)



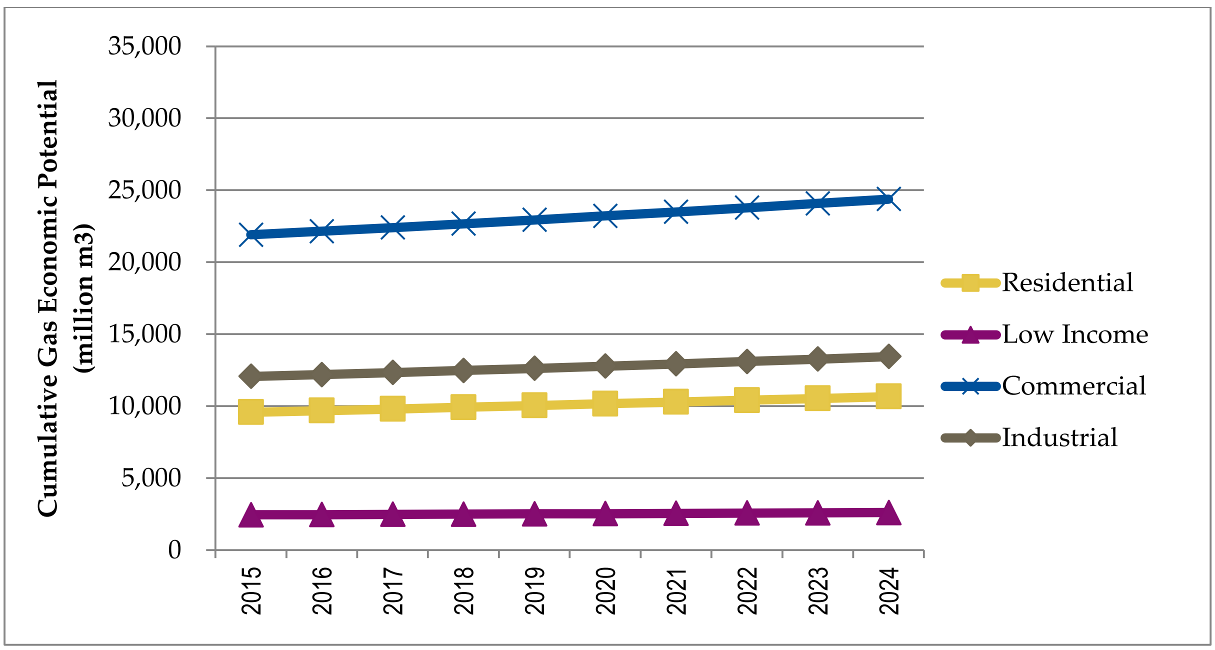
Source: Navigant analysis, 2014

Table A-1. Cumulative Gas Savings Technical Potential (cumulative million m³)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Residential	29,772	29,910	30,050	30,194	30,340	30,490	30,644	30,800	30,960	31,123
Low Income	4,581	4,608	4,635	4,663	4,691	4,720	4,749	4,779	4,809	4,841
Commercial	23,448	23,726	24,010	24,301	24,599	24,905	25,218	25,538	25,867	26,203
Industrial	12,258	12,392	12,532	12,678	12,830	12,988	13,151	13,321	13,496	13,678
Total	70,059	70,635	71,227	71,836	72,461	73,103	73,762	74,438	75,132	75,845

Source: Navigant analysis, 2014

Figure A-2. Cumulative Gas Savings Economic Potential (cumulative million m³)



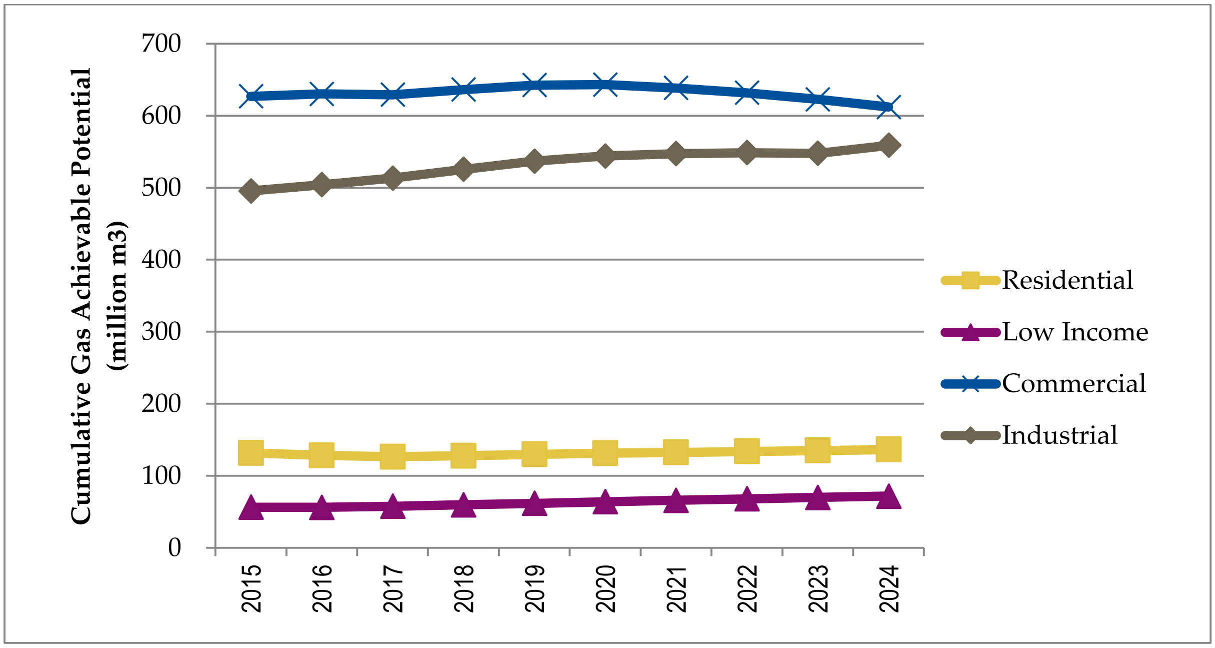
Source: Navigant analysis, 2014

Table A-2. Cumulative Gas Savings Economic Potential (cumulative million m³)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Residential	9,568	9,683	9,800	9,918	10,038	10,159	10,282	10,407	10,534	10,662
Low Income	2,445	2,461	2,478	2,494	2,511	2,528	2,546	2,564	2,582	2,600
Commercial	21,897	22,147	22,404	22,666	22,936	23,212	23,494	23,784	24,080	24,384
Industrial	12,059	12,190	12,327	12,469	12,617	12,771	12,931	13,096	13,267	13,445
Total	45,969	46,482	47,008	47,548	48,102	48,670	49,253	49,851	50,463	51,091

Source: Navigant analysis, 2014

Figure A-3. Gas Savings Cumulative Achievable Potential Reported Annually (cumulative million m³)



Source: Navigant analysis, 2014

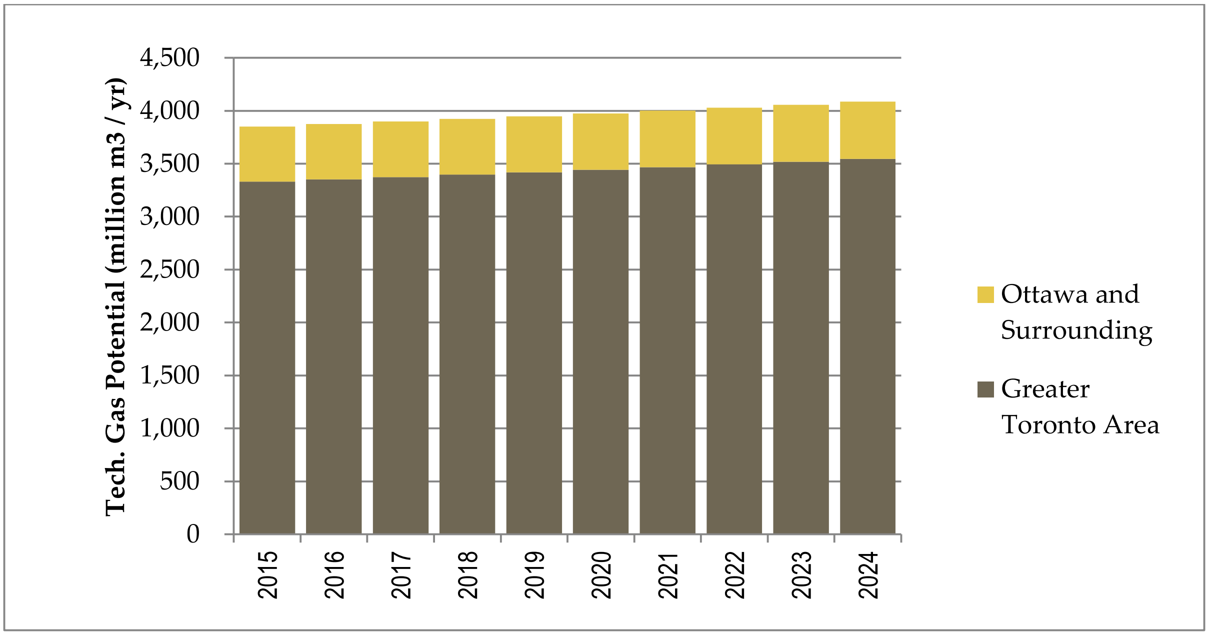
Table A-3. Gas Savings Cumulative Achievable Potential Reported Annually (cumulative million m³)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Residential	132	128	126	128	130	131	132	134	135	136	1,313
Low Income	56	56	58	60	62	64	66	68	70	72	631
Commercial	627	630	629	636	643	643	639	632	623	612	6,313
Industrial	496	504	513	525	537	544	547	549	548	559	5,322
Total	1,310	1,319	1,326	1,349	1,371	1,382	1,384	1,382	1,376	1,379	13,579

Source: Navigant analysis, 2014

Figure A-4 and Table A-4 provide the gas technical potential by service territory. The Greater Toronto territory accounts for about 87 percent of potential, while the Ottawa and surrounding territory accounts for 13 percent.

Figure A-4. Gas Savings Technical Potential by Territory (million m³/year)



Source: Navigant analysis, 2014

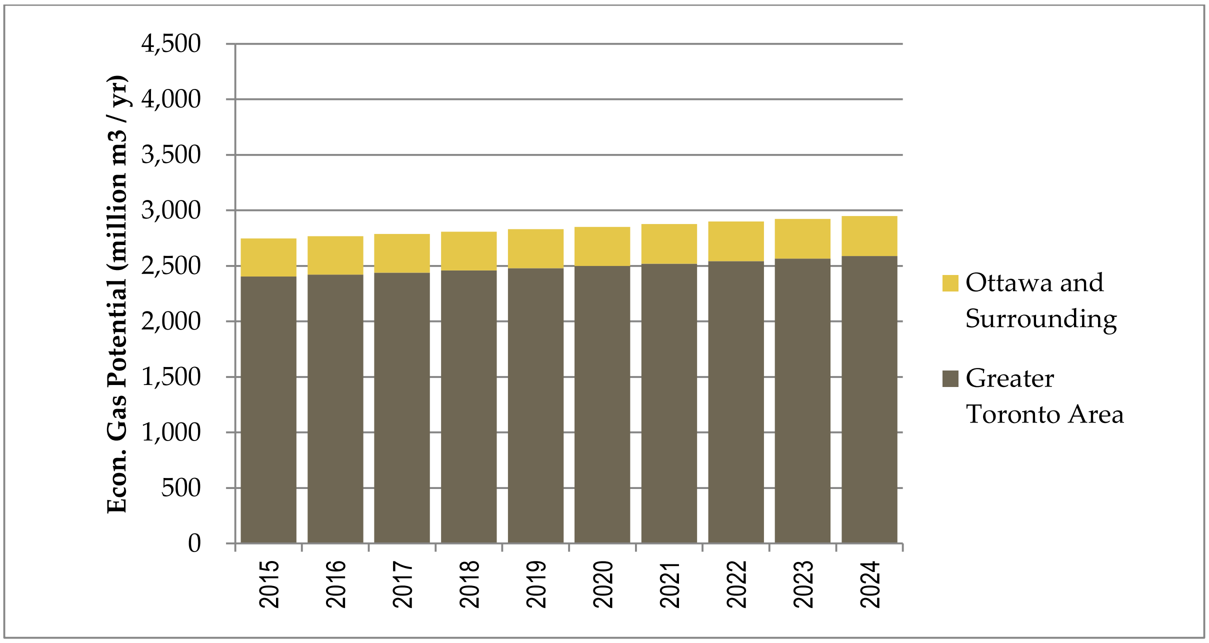
Table A-4. Gas Savings Technical Potential by Territory (million m³/year)

Year	Greater Toronto Area	Ottawa & Surrounding
2015	3,332	519
2016	3,353	521
2017	3,375	523
2018	3,397	526
2019	3,420	528
2020	3,443	531
2021	3,468	533
2022	3,493	536
2023	3,519	539
2024	3,545	542

Source: Navigant analysis, 2014

Figure A-5 and Table A-5 provide the gas economic potential by service territory. The Greater Toronto territory accounts for about 88 percent of potential, while the Ottawa and surrounding territory accounts for 12 percent.

Figure A-5. Gas Savings Economic Potential by Territory (million m³/year)



Source: Navigant analysis, 2014

Table A-5. Gas Savings Economic Potential by Territory (million m³/year)

Year	Greater Toronto Area	Ottawa & Surrounding
2015	2,403	343
2016	2,421	345
2017	2,440	347
2018	2,459	349
2019	2,479	351
2020	2,500	353
2021	2,521	355
2022	2,543	357
2023	2,565	359
2024	2,588	362

Source: Navigant analysis, 2014

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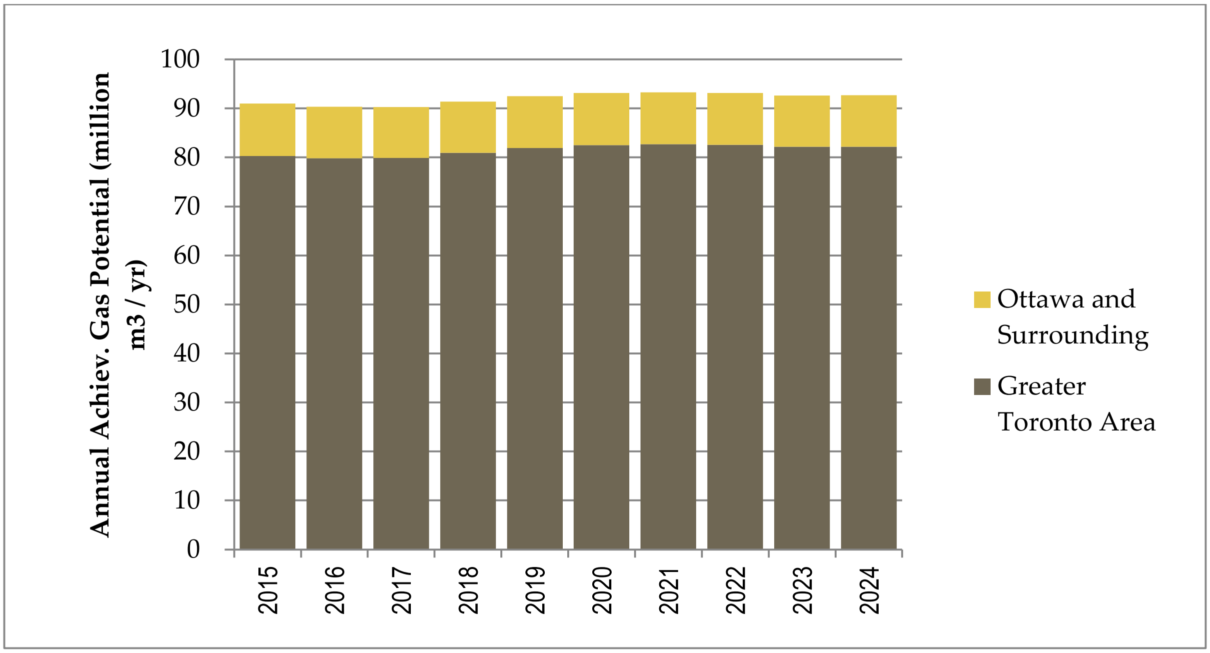
Figure A-6 and Table A-6 provide the gas achievable potential by service territory. By 2024, the Greater Toronto territory accounts for about 89 percent of potential, while the Ottawa and surrounding territory accounts for 11 percent.

Figure A-6. Gas Savings Annual Achievable Potential by Territory (million m³/year)



Source: Navigant analysis, 2014

Table A-6. Gas Savings Annual Achievable Potential by Territory (million m³/year)

Year	Greater Toronto Area	Ottawa & Surrounding	Total
2015	80	11	91
2016	80	11	90
2017	80	10	90
2018	81	10	91
2019	82	11	93
2020	83	11	93
2021	83	11	93
2022	83	11	93
2023	82	10	93
2024	82	11	93
Total	815	105	920

Source: Navigant analysis, 2014

Appendix B Data Inputs Used in TRC Calculations

This appendix includes some of the key data input used in Total Resource Cost (TRC) tests and savings potential calculations.

The avoided costs by savings type (natural gas, electricity, and water) are given in Table B-1.[40] Natural gas avoided costs are differentiated by end use and reflect the temporal correlation between avoided costs and savings for each end use.

Table B-1. Avoided Costs by Savings Type

	Natural Gas ($/m^3)					
Year	SpaceHeat	WaterHeat	IndustOther	SpaceWaterHeat	Electricity ($/kWh)	Water ($/liter)
2015	0.2053	0.1938	0.1947	0.2034	0.0996	0.0024
2016	0.2242	0.2135	0.2149	0.2222	0.1016	0.0024
2017	0.2423	0.2308	0.2324	0.2402	0.1036	0.0025
2018	0.2620	0.2491	0.2506	0.2595	0.1056	0.0025
2019	0.3132	0.2729	0.2753	0.3077	0.1077	0.0026
2020	0.3021	0.2834	0.2854	0.2988	0.1100	0.0026
2021	0.3022	0.2835	0.2855	0.2990	0.1122	0.0027
2022	0.3083	0.2892	0.2912	0.3049	0.1145	0.0028
2023	0.3145	0.2949	0.2971	0.3110	0.1168	0.0028
2024	0.3207	0.3008	0.3030	0.3173	0.1193	0.0029
2025	0.3272	0.3069	0.3091	0.3236	0.1219	0.0029
2026	0.3337	0.3130	0.3152	0.3301	0.1245	0.0030
2027	0.3404	0.3193	0.3215	0.3367	0.1272	0.0031
2028	0.3472	0.3256	0.3280	0.3434	0.1300	0.0031
2029	0.3541	0.3322	0.3345	0.3503	0.1329	0.0032
2030	0.3612	0.3388	0.3412	0.3573	0.1359	0.0033
2031	0.3684	0.3456	0.3480	0.3644	0.1389	0.0033
2032	0.3758	0.3525	0.3550	0.3717	0.1420	0.0034
2033	0.3833	0.3595	0.3621	0.3792	0.1451	0.0035
2034	0.3910	0.3667	0.3693	0.3867	0.1484	0.0036
2035	0.3988	0.3741	0.3767	0.3945	0.1517	0.0037
2036	0.4068	0.3815	0.3843	0.4024	0.1548	0.0037
2037	0.4149	0.3892	0.3920	0.4104	0.1579	0.0038
2038	0.4232	0.3970	0.3998	0.4186	0.1610	0.0039

[40] These avoided costs were provided by Enbridge and come from page 122 of "EGDI_2013-2014_DSM_Update_Evidence_EB-2012-0394_201302281.pdf". The growth rate between years 2041 and 2042 was used to extrapolate out to year 2053.

Year	Natural Gas ($/m³) SpaceHeat	WaterHeat	IndustOther	SpaceWaterHeat	Electricity ($/kWh)	Water ($/liter)
2039	0.4317	0.4049	0.4078	0.4270	0.1642	0.0040
2040	0.4403	0.4130	0.4159	0.4355	0.1675	0.0040
2041	0.4491	0.4213	0.4243	0.4442	0.1709	0.0041
2042	0.4581	0.4298	0.4329	0.4531	0.1744	0.0042
2043	0.4672	0.4384	0.4416	0.4621	0.1779	0.0043
2044	0.4766	0.4472	0.4505	0.4714	0.1815	0.0044
2045	0.4861	0.4562	0.4596	0.4808	0.1852	0.0045
2046	0.4958	0.4654	0.4689	0.4904	0.1890	0.0045
2047	0.5057	0.4747	0.4784	0.5002	0.1928	0.0046
2048	0.5158	0.4843	0.4880	0.5102	0.1967	0.0047
2049	0.5261	0.4940	0.4979	0.5204	0.2007	0.0048
2050	0.5367	0.5039	0.5080	0.5308	0.2048	0.0049
2051	0.5474	0.5141	0.5182	0.5414	0.2089	0.0050
2052	0.5583	0.5244	0.5287	0.5522	0.2132	0.0051
2053	0.5695	0.5349	0.5394	0.5632	0.2175	0.0052

Source: Enbridge

The nominal discount rate, inflation rate, and stock demolition rate are provided in Table B-2.

Table B-2. Rates Used in Analysis

Rate Type	Annual %
Nominal Discount Rate	7.0%
Inflation Rate	2.0%
Stock Demolition Rate	0.5%

Source: Enbridge and Navigant engineering judgment

Electric line and pipeline loss factors used to adjust avoided costs upward are given in Table B-3.

Table B-3. Line and Pipeline Loss Factors

Impact Type	(Pipe) Line Loss Factor
Electric Energy	1.048
Gas Energy	1.000
Water	1.200

Source: Enbridge

The avoided distribution costs considered in the sensitivity analysis of Section 4.3.2 are presented in Table B-4.

Table B-4. Avoided Distribution Costs ($/1000 m³)

Year	Industrial Processing	Space Heating	Water Heating	Space and Water Heating
2015	$4.44	$15.51	$4.21	$14.26
2016	$3.73	$13.05	$3.55	$12.00
2017	$3.69	$12.90	$3.51	$11.86
2018	$3.64	$12.73	$3.46	$11.71
2019	$3.59	$12.55	$3.41	$11.54
2020	$3.53	$12.35	$3.36	$11.36
2021	$3.48	$12.15	$3.30	$11.17
2022	$3.41	$11.93	$3.24	$10.97
2023	$3.35	$11.70	$3.18	$10.76
2024	$3.28	$11.45	$3.11	$10.54
2025	$3.21	$11.20	$3.05	$10.30
2026	$3.13	$10.94	$2.97	$10.06
2027	$3.05	$10.67	$2.90	$9.82
2028	$2.97	$10.40	$2.83	$9.56
2029	$2.89	$10.11	$2.75	$9.30
2030	$2.81	$9.82	$2.67	$9.03
2031	$2.72	$9.52	$2.59	$8.76
2032	$2.64	$9.21	$2.50	$8.48

Source: Navigant

Appendix C Measure Characterization Data

This appendix is provided as a separate Excel spreadsheet that contains all characterization data (e.g., consumption, costs and measure lifetimes) for every measure at the customer segment and replacement type level.

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Appendix D SIC Code Mapping

The Standard Industrial Codes (SIC) were used to map customer and sales data to each of the customer segments used in this study in accordance with Table D-1.

Table D-1. SIC Mapping Used to Allocate Enbridge Customer and Sales Data by Segment

Sector (Account Code)	Segment	Account Code/SIC Code
Residential Sector (RES or APT)	Residential	**RES**
	Apartment	**APT**
Commercial Sector (COM)	Multi-Residential	6513
	Office - Large	All other COM SIC <50xx and Use > 75,000 m^3
	Office - Small	All other COM SIC <50xx and Use <= 75,000 m^3
	Schools	8211
	Colleges & Universities	8221/8222
	Logistics & Warehouses	50xx/51xx
	Hospitals	806x
	Long Term Care	805x
	Accommodation	70xx
	Food Service	58xx
	Retail - Large	52xx to 59xx - Use > 75,000 m^3.
	Retail - Small	52xx to 59xx - Use <= 75,000 m^3
	New Construction	n.a.
	Other	All other > 50xx
	No Coding/Unidentified	Allocated to other segments based on weighted percentage of customers and sales

Sector (Account Code)	Segment	Account Code/SIC Code
Industrial Sector (IND)	Asphalt	2950
	Cement	32xx
	Primary Metals	33xx
	Chemicals/Pharma	28xx
	Food & Beverage	20xx
	Pulp & Paper	27xx
	Power Generation/Electric Services	4911
	Petroleum Refining	2911
	Green House/Agriculture	100/200
	Other Manufacturing Large	All other IND SICs with Use >= 0.5 million m^3/year
	Other Manufacturing Small	All other IND SICs with Use < 0.5 million m^3/year
	Other Industry (including mining, construction, etc.)	800/1731
	Not Coded/Unidentified	Allocated to other segments based on weighted percentage of customers and sales

Source: Navigant

Appendix E Benchmarking Analysis

This appendix compares 2012 natural gas demand side management (DSM) program the utility as a whole across several different utilities.

E.1 Organizations Reviewed

Table E-1 illustrates that we collected 2012 data and information for natural gas DSM program results for 11 investor-owned utilities (IOUs) in six states in the US along with Enbridge's 2012 data.

Table E-1. Organizations Reviewed

State	Utility
Canada	Enbridge
IA	IPL (IA)
	MAEC (IA)
IL	Ameren (IL)
	Integrys (IL)
	Nicor Gas
MA	NGrid (MA)
	NSTAR (MA)
MI	Consumers Energy (MI)
	DTE
MN	XE (MN)
VT	Vermont Gas

E.2 Methodology and Scope

This section describes the methodology used to collect data and information, analyze and compare impacts and costs overall and by customer sector.

The benchmarking data for each organization were prepared as follows:

Collected reported incremental DSM program results for 2012:

- Expenditures
- Natural Gas Energy savings

The sources for almost all of the DSM program data were the utilities' annual reports on their 2012 DSM programs.

Collected baseline data for 2012

- Revenues
- Natural Gas Energy sales

The main source for the baseline data was Form 176 from the Energy Information Administration's web site (www.eia.doe.gov)[41]

Normalized incremental results and DSM expenditures:

- DSM expenditures as a percentage of revenue
- Natural gas energy savings as a percentage of energy sales

Calculated costs of savings on a first year basis:

- Divided DSM expenditures by DSM program natural gas energy savings, $/m^3, first year

The cost of energy savings is calculated on a first year basis. It is not levelized cost of lifetime savings, thus not comparable to supply side $/m^3. The cost of first year energy savings is used in this benchmarking analysis simply to identify 1) typical costs on a first year basis and 2) organizations that achieved high energy savings at costs below the typical.

Although every effort is made to collect comparable data, given the inherent variation in organizations' evaluation and reporting practices and in their program offerings, the results cannot be considered a strictly "apples-to-apples" comparison. The usual caveats apply to any accounting information: different organizations aggregate and allocate costs differently (e.g., Key Account manager time), so these results can only be taken as indicative, particularly regarding the cost per first year m^3 saved. Benchmarking is, however, useful to identify which organizations and programs merit being analyzed more closely.

E.3 2012 Natural Gas Performance Results over All Sectors

This section reviews DSM program spending, savings, and costs over all customer sectors.
Table E-2. 2012 Natural Gas DSM Results over All Sectors shows the median result for natural gas DSM spending, savings, costs, and energy costs over all customer sectors for the reviewed organizations. Given that some of the datasets are skewed or contain outliers, the median is used here as it is a better indication of central tendency than the average.

[41] Baseline data includes values for both energy and deliveries.

Table E-2. 2012 Natural Gas DSM Results over All Sectors[42]

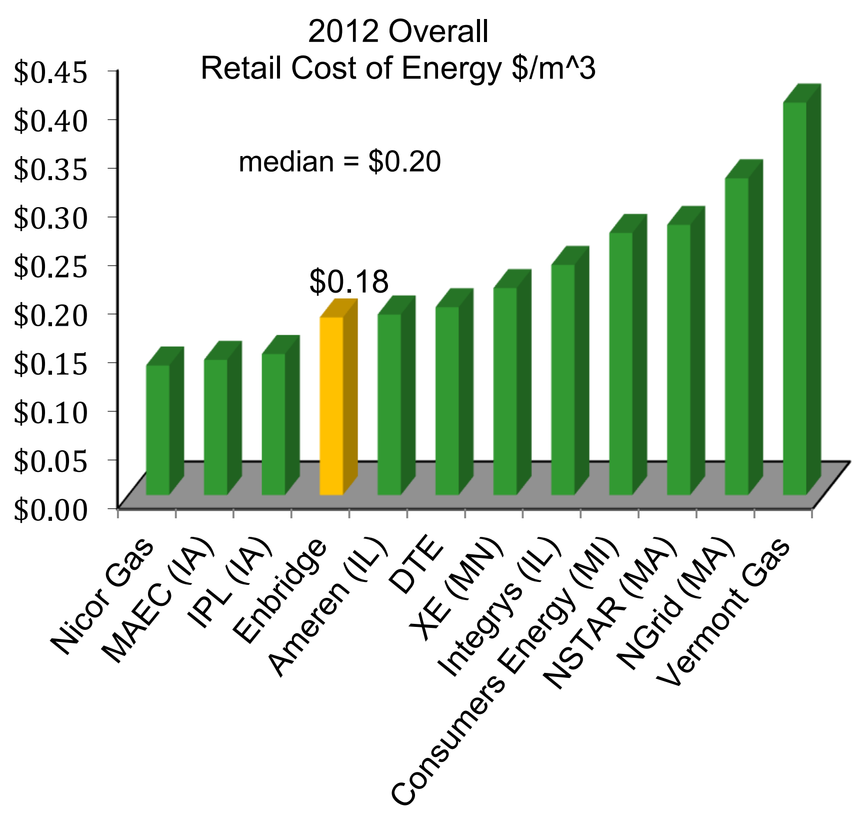
	Spending as % of Revenue	Energy Savings as % of Sales	Retail Cost of Energy $/m^3	Cost of First Year Savings $/m^3
All Region Median	2.6%	0.8%	$0.20	$0.94
Enbridge	1.6%	0.9%	$0.18	$0.33

Retail Cost of Natural Gas

The average retail cost of natural gas over all customer sectors was calculated by dividing total annual retail revenue by total annual retail sales for each organization.

Enbridge's 2012 average retail cost of energy of $0.17/m^3 is below the median of $0.20/m^3 (Figure E-1).

Figure E-1. 2012 Retail Cost of Natural Gas



[42] Gas sales (m^3) and revenues ($) include both distribution and transport sales.

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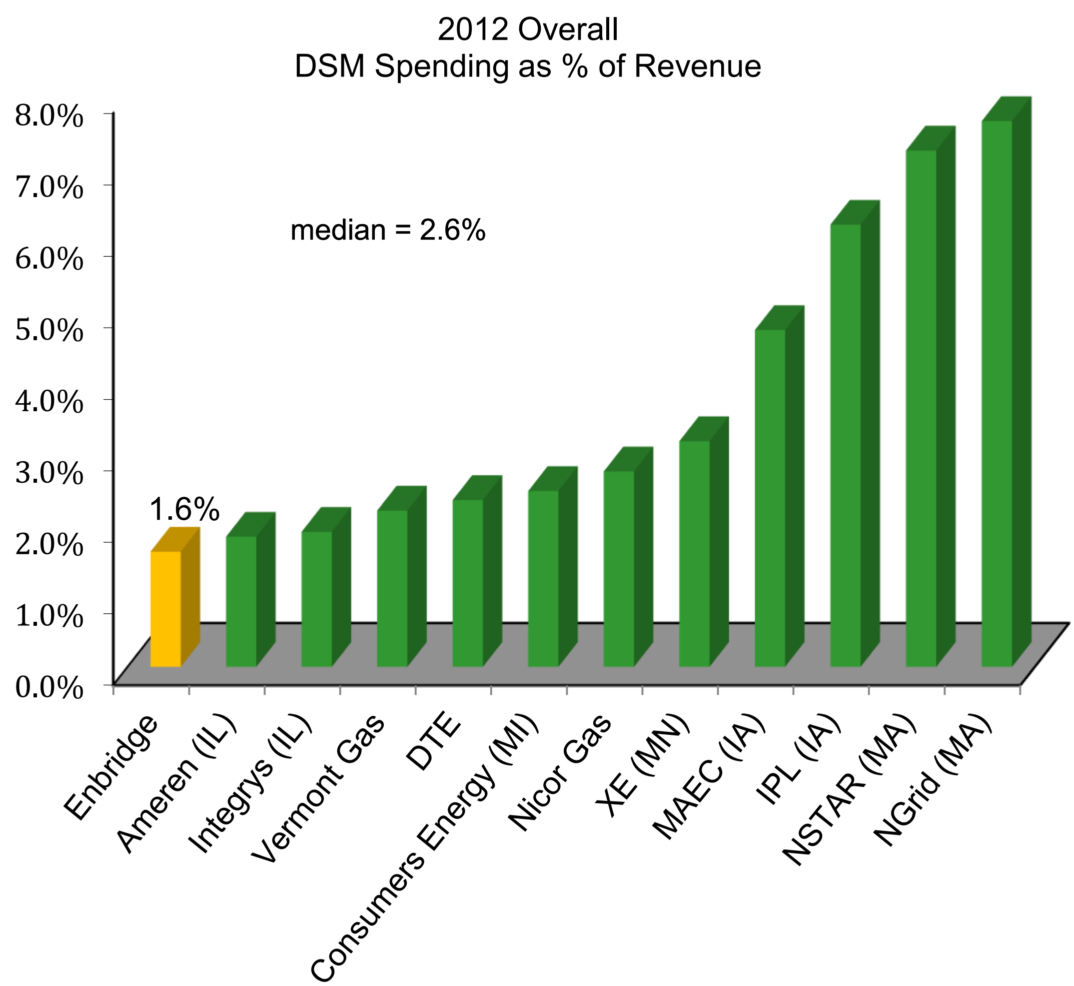
Natural Gas DSM Spending

This section reviews DSM spending as a percentage of retail revenue over all customer sectors.

Enbridge's overall DSM spending as a percentage of revenue in 2012 is 1.6% which is below the median of 2.6% (Figure E-2).

Figure E-2. 2012 DSM Spending as a Percentage of Revenue

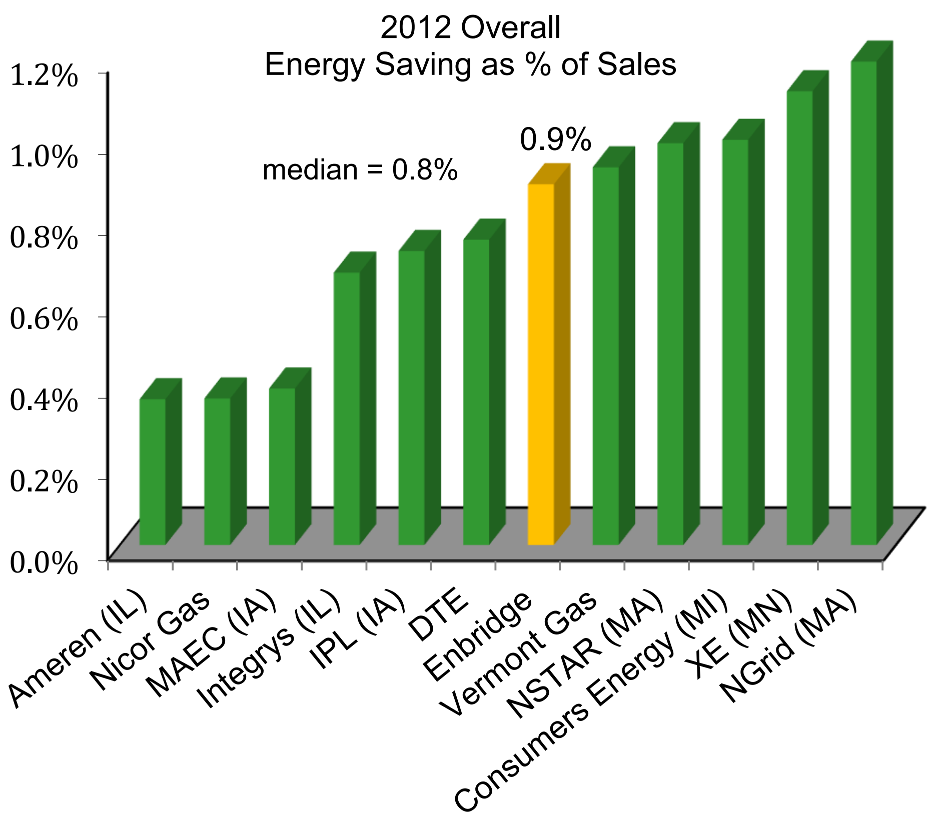


Natural Gas Savings

This section reviews natural gas savings as a percentage of sales over all customer sectors.

Enbridge's energy savings as a percentage of sales in 2012 is 0.9% which is above the median of the group in Figure E-3.

Figure E-3. 2012 Gross Energy Savings as a Percentage of Gas Sales



Cost of Natural Gas Savings

This section discusses the cost of first year natural gas energy savings for the DSM program year.

Figure E-4 shows Enbridge's cost of natural gas savings in 2012 is the lowest of the group at $0.33/m^3.

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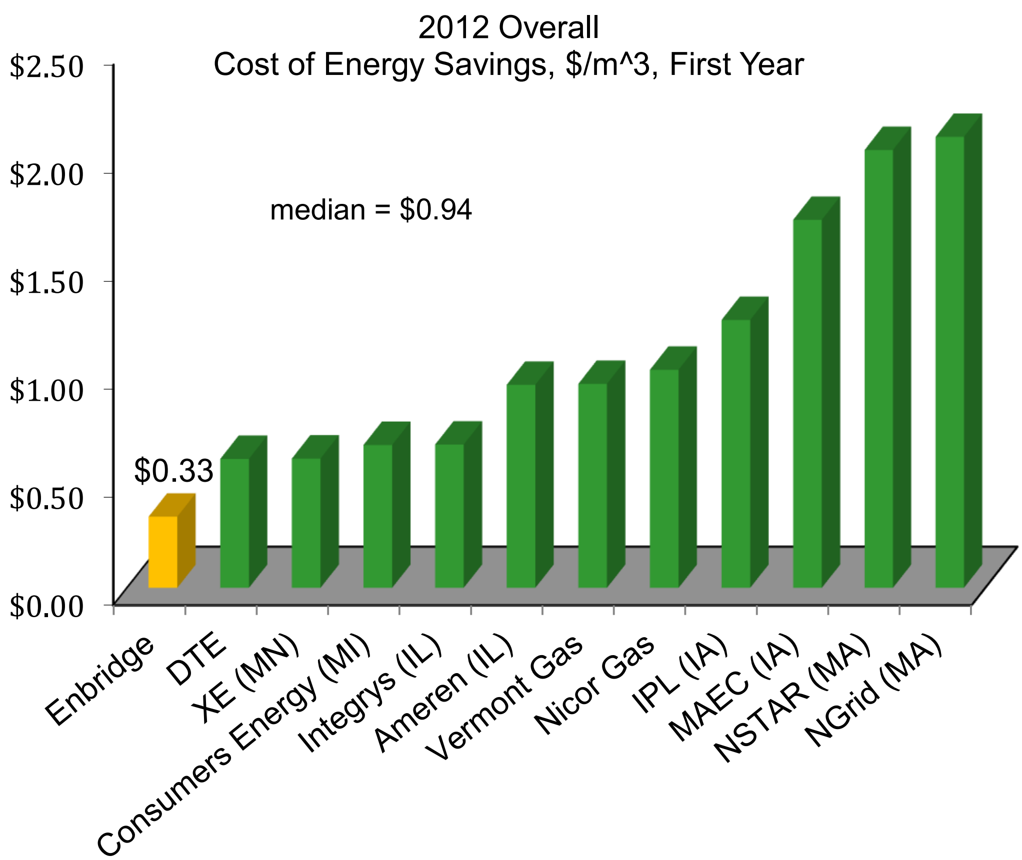
Figure E-4. 2012 Cost of Natural Gas Savings

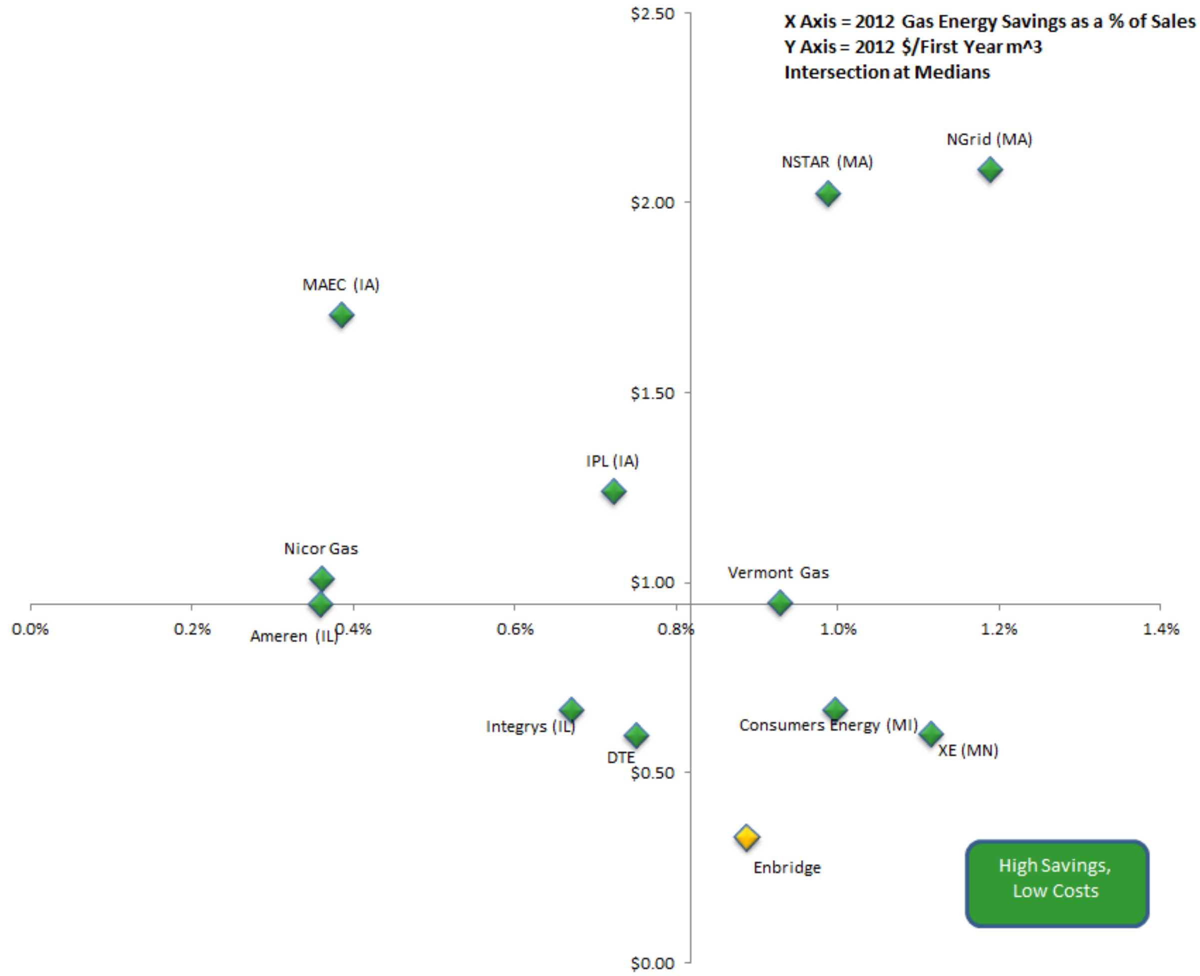


Identifying High-Savings and Low-Cost DSM Organizations

This section identifies the organizations with natural gas DSM programs that achieved above median savings at or below median costs in 2012.

For the organizations reviewed, the scatter plot in Figure E-5 below illustrates where each organization falls relative to median natural gas savings and median costs of savings. Natural gas energy savings as a percentage of sales is on the horizontal axis; first year cost of energy savings is on the vertical axis; and the axes are set at the median values. Thus, the organizations in the bottom right quadrant are the ones that achieved above median energy savings at costs below the median, i.e., high savings, low costs.

Figure E-5. 2012 Natural Gas Savings and First Year Costs ($/m^3) Over All Sectors



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E.4 Detailed Data Tables

The table below provides the values used in calculating benchmarked savings and costs in this benchmarking section.

Table E-3. Detailed Benchmark Data

2012 DSM Results by State										
		2012 Incremental DSM Results		2012 Retail				Normalized DSM Results		
Customer Sector	Utility	m^3	Costs $M	Customers	Annual m^3	Revenue $M	Cost of Energy	Spending as % of Revenue	Energy Savings as % of Sales	Cost of Savings
							$/m^3			$/m^3
Residential	**Median**	**9,338,557.2**	**$16.4**	**774,589.0**	**1,647,405,556**	**$663**	**$0.34**	**2.7%**	**0.9%**	**$1.46**
Canada	Enbridge	14,086,586	$16.6	1,929,313	3,868,127,000	$1,239	$0.32	1.3%	0.4%	$1.18
IA	IPL (IA)	6,113,739	$9.8	197,176	339,611,926	$120	$0.35	8.2%	1.8%	$1.61
	MAEC (IA)	8,692,186	$16.2	505,474	906,232,576	$296	$0.33	5.5%	1.0%	$1.86
IL	Ameren (IL)	7,883,716	$10.9	740,612	1,352,726,933	$547	$0.40	2.0%	0.6%	$1.38
	Integrys (IL)	9,984,928	$10.6	926,677	2,973,245,243	$925	$0.31	1.1%	0.3%	$1.06
	Nicor Gas	12,259,352	$19.4	2,019,284	5,554,469,202	$1,174	$0.21	1.7%	0.2%	$1.58
MA	NGrid (MA)	27,009,771	$71.1	808,566	1,942,084,180	$779	$0.40	9.1%	1.4%	$2.63
	NSTAR (MA)	4,867,191	$19.5	245,507	505,168,314	$212	$0.42	9.2%	1.0%	$4.01
MI	Consumers Energy (MI)	37,484,557	$36.7	1,824,936	3,953,325,468	$1,479	$0.37	2.5%	0.9%	$0.98
	DTE	21,263,456	$21.1	1,127,280	2,876,020,409	$885	$0.31	2.4%	0.7%	$0.99
MN	XE (MN)	8,006,986	$8.7	403,525	841,342,358	$242	$0.29	3.6%	1.0%	$1.08
VT	Vermont Gas	944,655	$1.5	39,917	85,280,468	$50	$0.59	2.9%	1.1%	$1.54
C&I	**Median**	**13,911,000.9**	**$5.4**	**65,859.0**	**2,158,729,958**	**$245**	**$0.11**	**2.8%**	**0.9%**	**$0.48**
Canada	Enbridge	78,445,878.0	$14.0	160,167.0	6,567,894,000	$666	$0.10	2.1%	1.2%	$0.18
IA	IPL (IA)	4,489,813.3	$3.3	25,653.0	1,127,998,973	$92	$0.08	3.6%	0.4%	$0.74
	MAEC (IA)	3,503,747.4	$4.6	51,580.0	2,267,616,978	$146	$0.06	3.1%	0.2%	$1.31
IL	Ameren (IL)	7,033,988.1	$3.1	69,512.0	2,815,069,313	$227	$0.08	1.4%	0.2%	$0.45
	Integrys (IL)	23,638,255.7	$11.7	62,206.0	2,049,842,938	$263	$0.13	4.5%	1.2%	$0.50
	Nicor Gas	28,621,855.2	$21.9	168,570.0	5,809,085,047	$340	$0.06	6.4%	0.5%	$0.77
MA	NGrid (MA)	14,108,121.2	$14.6	82,795.0	1,517,942,300	$346	$0.23	4.2%	0.9%	$1.04
	NSTAR (MA)	6,966,670.1	$4.4	27,295.0	692,874,911	$120	$0.17	3.7%	1.0%	$0.64
MI	Consumers Energy (MI)	35,128,939.6	$11.4	128,412.0	3,337,387,365	$482	$0.14	2.4%	1.1%	$0.33
	DTE	24,330,708.1	$6.2	88,831.0	3,199,938,940	$288	$0.09	2.2%	0.8%	$0.25
MN	XE (MN)	13,713,880.6	$4.4	34,081.0	1,106,077,509	$172	$0.16	2.5%	1.2%	$0.32
VT	Vermont Gas	1,168,217.8	$0.5	5,573.0	142,292,075	$41	$0.29	1.3%	0.8%	$0.47
Overall	**Median**	**27,672,025.1**	**$23.2**	**850,742.5**	**3,813,911,362**	**$949**	**$0.20**	**2.6%**	**0.8%**	**$0.94**
Canada	Enbridge	92,532,464.0	$30.6	2,089,480.0	10,436,021,000	$1,905	$0.18	1.6%	0.9%	$0.33
IA	IPL (IA)	10,603,552.7	$13.2	222,829.0	1,467,610,899	$213	$0.15	6.2%	0.7%	$1.24
	MAEC (IA)	12,195,933.7	$20.8	557,054.0	3,173,849,554	$441	$0.14	4.7%	0.4%	$1.70
IL	Ameren (IL)	14,917,704.3	$14.0	810,124.0	4,167,796,246	$773	$0.19	1.8%	0.4%	$0.94
	Integrys (IL)	33,623,183.9	$22.4	988,883.0	5,023,088,181	$1,187	$0.24	1.9%	0.7%	$0.67
	Nicor Gas	40,881,207.6	41.3	2,187,854.0	11,363,554,248	1,514.3	$0.13	2.7%	0.4%	$1.01
MA	NGrid (MA)	41,117,892.4	85.8	891,361.0	3,460,026,479	1,124.6	$0.33	7.6%	1.2%	$2.09
	NSTAR (MA)	11,833,861.2	24.0	272,802.0	1,198,043,225	332.2	$0.28	7.2%	1.0%	$2.03
MI	Consumers Energy (MI)	72,613,497.7	48.1	1,953,348.0	7,290,712,833	1,961.6	$0.27	2.5%	1.0%	$0.66
	DTE	45,594,164.5	27.3	1,216,111.0	6,075,959,349	1,172.5	$0.19	2.3%	0.8%	$0.60
MN	XE (MN)	21,720,866.3	13.0	437,606.0	1,947,419,867	414.0	$0.21	3.2%	1.1%	$0.60
VT	Vermont Gas	2,112,873.0	2.0	45,490.0	227,572,544	91.6	$0.40	2.2%	0.9%	$0.95

Enbridge Energy Efficiency Resource Assessment

Responses to Stakeholder Comments

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1. Overarching Comments

This section offers some overarching responses to intervenor comments.

1.1 Approach and Reasonableness

A number of questions posed by intervenors relate to the modeling approach and to the overall level of estimated gas savings potential (with most comments suggesting the values are low). This section represents our attempt to address many of these questions with a common response. Where deemed necessary, we supplement this response with more detailed information later in this document.

Navigant has found in its experience that there is a point of diminishing, and even negative, returns when adding complexity to any model. This is certainly true in a potential study, where the vast majority of savings tends to come from a small minority of measures (the infamous 80/20 rule). As such, we consider that stakeholders are best served when inevitably limited resources are focused on those measures likely to have a material impact on the savings estimates. Adding measures to an already reasonable list of candidates typically a) adds very little, if anything, in terms of new savings, and more importantly b) detracts from the level of attention that can be paid to those measures offering greater savings, since every study has resource and schedule limitations. Thus, we would argue that having too many measures in a study with a finite budget and schedule can in fact worsen, rather than improve, the accuracy of the forecast. The list of measures in this study, as noted in the report, was developed in conjunction with Enbridge and reviewed by intervenors, drew heavily on the list of approved measures provided by the OEB (per the RFP), and is considered to be sufficiently comprehensive to capture the vast majority of savings potential. Adding to this list, in the absence of a detailed and convincing argument otherwise, is not expected to yield a material increase in the savings estimates reported in this study.

Overall, when considering the long history of successful DSM programs by Enbridge (where a lot of low hanging fruit has been harvested), the range of observed savings from benchmarked programs in Canada and the U.S., the results of this study are deemed to offer a very objective and reasonable estimate of the level of savings likely to be achieved in Enbridge's service territory. We have made every effort to provide neither an overly optimistic nor an overly pessimistic view of savings, but rather have provided an *objective* assessment of the *expected* level of potential (i.e., the mean value, rather than the highest possible or lowest possible estimate of a range, implying that savings potential could be somewhat higher or lower than the value forecast).

Methods employed in this study are common throughout the industry, consistent with best practices, and have been utilized in dozens of studies throughout the country, including for all four IOUs in California (with minor modifications to the approach). Any forecast of technology adoption is fraught with uncertainty, regardless of the approach used and level of rigor employed. As such, all studies of this nature should be taken as one of several inputs into the target setting, regulatory, and detailed program design process. Using our best judgment, we expect that a 90% confidence interval on the achievable estimates in this study would likely include values that are plus or minus 20% of those reported. So, modifications to results that are likely to result in very small percentages of changes in savings are well within the overall "noise" or uncertainty of this study, or any potential study. While some may claim higher degrees of confidence in their reported values, we are highly suspicious of claims of a single "right" answer that is not subject to considerable uncertainty. These studies have the significant challenge of having to use common methods to forecast adoption of dozens of very different technologies, in very different customer segments. While more sophisticated forecasting methods are available (e.g., employing discrete choice analysis methods), these approaches are a) cost prohibitive to conduct for a study with this many technologies, and b) are expected to only marginally improve forecast quality.

Additionally, while we have endeavored to be transparent in our approach used, we recognize that it can be difficult for stakeholders to fully understand the modeling construct. We believe this again to be the case with any study, though we recognize that some do a better job than others in making the approach transparent. In a further attempt to improve stakeholder understanding, we would invite you to peruse Navigant's simplified online technology adoption simulator, which can be found at: http://forio.com/simulate/navigantsimulations/technology-diffusion-simulation/overview/.

1.2 Sensitivity Analysis and Avoided Cost Discussion

Consistent with the RFP, Navigant has performed many sensitivity analyses that are included in the report (with another newly added sensitivity appearing in Section 5.4.4 of the revised report), which we believe provide sufficient insight into how much savings potential is achieved in various market settings. These sensitivity analyses looked at the impact of CO2 prices, avoided distribution costs, non-energy benefits, TRC screening thresholds, and budget levels. Navigant performed analyses that we believe are inclusive of a reasonable range of uncertainty and market environments, and all were agreed upon by Enbridge staff.

To summarize these results, we note that CO2 prices had the largest impact on economic potential, where we found economic potential to increase by about 6.5 percent relative to the base case in the $60 per tonne scenario. At these levels of CO2 prices, the avoided gas costs were effectively increased by 57 percent, which we consider to be a reasonable proxy for the impact that would be observed by including the combination of additional avoided costs, externalities/benefits, and currently implemented CO2 prices (e.g., $30 per tonne, as is implemented in British Columbia). Furthermore, the distribution cost and non-energy benefits analysis now included in Section 5.5.4 of the revised report shows that impacts on achievable potential are slightly less than half of those experienced for economic potential in relative terms. Applying the ratio of the change in achievable potential to the change in economic potential from this scenario suggests that the 6.5 percent increase in economic potential due to the $60-per-tonne CO2 price scenario is likely to result in about a 3 percent increase in achievable potential.

Finally, we note that the impact of increasing the assumed avoided costs is not always as large as one might expect, and under some circumstances can actually reduce achievable savings for a given budget level. The reason is that new, higher cost measures (which may be introduced with higher avoided costs) compete with lower cost measures in the market. As a result, the incremental savings are not as great as one might think, and the DSM spending may be higher for these higher cost measures which puts upward pressure on DSM spending.

At these levels of impact, a more rigorous and costly examination of avoided costs and externalities is not likely to lead to materially different results.

2. GEC Comments

On December 10th, Chris Neme provided Enbridge with a document with comments from GEC. Those comments are addressed in the following sections.

2.1 Achievable Potential Levels Off

Comment

The study concludes that achievable potential effectively levels off (i.e. becomes almost asymptotic) starting with scenario F – i.e. with an annual average budget of about $58.5 million 9.6% (see table ES-3). That is inconsistent with the experience of other utilities which are spending many times more than that and, in at least some cases, saving more than that. It is also inconsistent with Ontario's own experience with significant ramp up of the ecoEnergy home retrofit program, which at its peak had nearly 170,000 participants per year (fiscal year 2010-2011). Just a few years of that level of participation in a residential retrofit program (with appropriate adjustments for the portion of the province served by Enbridge) would result in greater residential savings than the 10 year achievable numbers for Scenario F – before addressing other savings opportunities from showerheads, thermostats, efficient water heaters, etc. Moreover the cost of such an effort would seem to be well above what the study assumes will be spent in even the most aggressive scenario on the residential sector.

Response

This question relates to the overall magnitude of estimated savings from this study, for which we provide a general response in the second and third paragraphs of Section 1.1. We therefore refer the reader to the response offered in Section 1.1.

2.2 Modelling Whole-House Retrofits

Comment

The potential in the residential retrofit setting would have benefitted from a different approach – modelling a whole-house retrofit program based on actual costs and savings as experienced by Enbridge's current program. It appears as if the "measure by measure" analysis here significantly underestimates the potential.

Response

The comment is correct that the approach taken in the study builds up an estimate of energy efficiency potential based on the analysis of individual measures. The alternative modeling approach based on a whole house retrofit proposed in this comment has several draw backs.

i. The first is that it requires use of a number of archetype buildings, which tends to limit the application of measures due to the limited number of archetypes that can reasonably be modelled. For example, the potential for space heating will differ with building configuration and size, but not all buildings of a particular configuration have the same stock of equipment and appliances.

ii. The second issue is that the savings from some measures may interact. As a result, if a whole building modelling approach is taken, the savings resulting from implementing a measure in a building may differ depending on which group of measures are implemented. This introduces a number of issues in terms of assigning savings to a measure or estimating cost-effectiveness. In general, the total savings resulting from implementing a group of measures may be less than the savings that would be estimated for implementing the measures individually.

Navigant believes that this is a reasonable approach given that it allows measures to be considered independently and, if anything results in a conservatively high estimate of energy efficiency potential.

2.3 *First-Year vs. Lifetime Savings*

Comment

The report focuses almost entirely on "first year savings". For every table reporting savings, there should either be (1) both first year savings numbers and lifetime savings numbers; and/or (2) the weighted average measure life for the first year savings. This is important enough that it should not be relegated to a summary discussion in an appendix.

Response

We first note that the analysis method does indeed consider measure lifetimes (by way of a levelized cost of savings calculation) in determining incentive levels assumed for each measure (effectively accounting for measure life and CCM in determining measure-level incentives, which encourages adoption of longer-lived measures, all else equal). As a result, the *analysis method* does not in fact focus on "first year" savings. However, there are a number of reasons we chose to provide most *results* in the form of annual potential, as opposed to cumulative cubic meters (which factors in measure life). First, looking at annual first year values provides a logical way to compare potential against annual sales volumes (e.g., so that potential as a percentage of sales can be readily analyzed). Second, providing annual values is consistent with many other potential studies (e.g., the last study performed by Marbek for Enbridge) and thus provides a better basis for comparison. Finally, benchmarking results also typically look at annual first-year savings, again providing a good point of reference for comparison. For interested parties, high-level results of cumulative cubic meters are provided in the appendix for your review.

2.4 *Net Benefits*

Comment

The report shows benefit-cost ratios, but not net benefits. Net benefits should be shown for all economic potential and achievable potential scenarios, as that is much more important than ratios.

Response

Please see Sections 5.3.3, 5.4.1 and 5.4.2 of the revised report for net benefits for the base case budget, the budget sensitivity analysis and the TRC sensitivity analysis.

2.5 *Levelized Utility Cost*

Comment

The report would benefit from showing levelized (over the life of the measures) utility cost per unit of annual savings achieved.

Response

We have provided below the levelized cost of gas savings from the base case achievable scenario for a total resource cost (TRC) and utility cost (UCT) perspective. As there are a number of different outputs (and methods of calculation) for the requested information, and since it is not clear which was of interest, we have provided the information herein rather than in the report. Table 2-1 outlines the costs that are considered in each perspective, and Table 2-2 provides the levelized costs and weighted average measure life for this scenario. The cost categories included in each of the perspectives are consistent with the guidance in the California Standard Practice Manual. The equation below describes how these levelized costs are calculated.

$$LevCosts = \frac{\sum_i PVofCosts_i}{\sum_i PVofGasSavings_i}$$

Where,

LevCosts : the levelized cost of gas savings for all measures adopted in the base case achievable scenario

$PVofCosts_i$: the present value of costs for measure i, over measure i's lifetime

$PVofGasSavings_i$: the present value of gas savings for measure i, over measure i's lifetime

Table 2-1. Costs Included In Each Cost Test

Costs Included	TRC	UCT
Measure Incremental Cost	X	
Incentives		X
Administrative Costs	X	X

Source: Navigant, 2014

Table 2-2. Levelized Cost of Gas Savings by Cost Test and Weighted Average Measure Life

Costs Included	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Levelized TRC Cost ($/m3)	0.47	0.47	0.48	0.49	0.51	0.52	0.53	0.54	0.56	0.57
Levelized UCT Cost ($/m3)	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Weighted Avg. Measure Life (years)	14.41	14.50	14.56	14.61	14.65	14.69	14.71	14.73	14.74	14.75

Source: Navigant, 2014

2.6 Potential by Replacement Type

Comment

The results as reported feel very much still like a black box, particularly the achievable potential. As Kai suggested during the consultative meeting, the technical, economic and achievable potential should be reported separately – by sector – for lost opportunity markets (new construction and time-of-replacement) and discretionary retrofits. The portion of lost opportunity savings that are able to be captured should be notably different than the portion of retrofit potential that could be captured over a 10 year period. Right now, all we can see is that, under scenario F for example, about 40% of total economic potential is achieved. To judge whether that is reasonable, we need to know, for example, whether that is a weighted average of 20% of retrofit potential and 70% of lost opportunity potential, or whatever other combination is

> *essentially assumed by the study. Therefore please provide the spreadsheet of measures with these outputs as described in yesterday's email. It will both help demonstrate the credibility of the overall estimates in the study, and will provide better information for actually using the study to identify measures and programs to be ramped up vs those with limited potential. Including it as an Appendix would also be appropriate.*

Response

Navigant has broken out the base case cumulative achievable potential by new (NEW), retrofit (RET), and replace-on-burnout (ROB) measures in Table 2-3 through Table 2-5 to bring clarity to this topic.

Table 2-6 breaks out the 2024 potential by sector, and Table 2-7 shows the percentage of technical potential that was economic.

Table 2-3. Gas Savings Technical Potential by Replacement Type (million m3/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
NEW	44	89	134	180	227	274	322	370	419	469
RET	2,741	2,724	2,708	2,692	2,677	2,661	2,645	2,630	2,615	2,600
ROB	1,066	1,061	1,055	1,050	1,045	1,039	1,034	1,029	1,024	1,019
Total	3,851	3,874	3,898	3,922	3,948	3,974	4,001	4,029	4,058	4,087

Source: Navigant, 2014

Table 2-4. Gas Savings Economic Potential by Replacement Type (million m3/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
NEW	35	71	108	145	183	221	259	299	338	379
RET	2,229	2,216	2,202	2,189	2,175	2,162	2,149	2,136	2,124	2,111
ROB	481	479	477	474	472	469	467	465	462	460
Total	2,746	2,766	2,787	2,808	2,830	2,852	2,876	2,900	2,924	2,950

Source: Navigant, 2014

Table 2-5. Gas Savings Achievable Potential by Replacement Type (million m3/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
NEW	14	29	44	60	76	93	110	127	145	164
RET	61	123	186	252	318	385	453	520	587	654
ROB	16	29	41	52	62	71	79	87	95	102
Total	91	181	272	363	455	549	642	735	828	920

Source: Navigant, 2014

Table 2-6. Gas Savings Potential by Sector and Replacement Type in 2024 (million m3/year)

Replacement Type	Sector	Technical	Economic	Achievable
NEW	Residential	139	78	27
	Low Income	25	14	10
	Commercial	161	149	45
	Industrial	144	139	82
	SubTotal	469	379	164
RET	Residential	911	510	74
	Low Income	148	131	26
	Commercial	931	884	336
	Industrial	610	586	218
	SubTotal	2600	2111	654
ROB	Residential	545	61	29
	Low Income	85	12	8
	Commercial	360	358	57
	Industrial	29	29	8
	SubTotal	1019	460	102

Source: Navigant, 2014

Table 2-7. Gas Savings Cumulative Achievable Potential as a Percentage of Economic Potential (%)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
NEW	40.7%	40.7%	40.9%	41.1%	41.5%	41.9%	42.3%	42.7%	43.0%	43.3%
RET	2.7%	5.5%	8.5%	11.5%	14.6%	17.8%	21.1%	24.4%	27.7%	31.0%
ROB	3.3%	6.1%	8.6%	10.9%	13.1%	15.1%	17.0%	18.8%	20.5%	22.2%
Total	3.3%	6.6%	9.7%	12.9%	16.1%	19.2%	22.3%	25.3%	28.3%	31.2%

Source: Navigant, 2014

2.7 Lost Opportunity and Retrofit Potential

Comment

Related to the point above, we are surprised that the achievable potential over 10 years is assumed to be only ~30% (Residential) to 45% (industrial) of economic potential even under the most aggressive scenarios. At least in lost opportunity markets, we know from experience in other jurisdictions that it is possible to achieve market penetration rates of 70-90% in lost opportunity markets. We also know that it is possible to achieve 70% or greater market penetration rates in retrofit markets, though we believe that it would likely take longer (20 years?) to achieve those levels in some cases, such as residential retrofits.

Response

We see from Table 2-7 that the achievable potential for lost opportunity (referred to herein as "'replace on burnout," or "ROB") measures reaches 22.2 percent of the economic potential by 2024. However, we must recognize that economic potential is not constrained by stock turnover, which is the natural failure of equipment or processes dictated by expected measure lifetimes. We can estimate the maximum fraction[1] of economic ROB potential that could be achieved by looking at the weighted average lifetime of measures that are included in achievable potential, and then determining the fraction of measures that are expected to fail/turnover each year. Of the measures included in achievable potential, Navigant calculated the weighted average lifetime to be 16.2 years, and Table 2-8 provides the cumulative stock turnover that would be expected from a measure with that lifetime.[2]

If we then compare the achievable potential as a percentage of economic potential (Table 2-7) with the stock turnover (Table 2-8), we see that the 2024 achievable potential is 73.8% (Table 2-9) of the maximum possible achievable potential, considering the constraints imposed by stock turnover. This value of 73.8% aligns well with GEC's rule of thumb concerning replace-on-burnout measures.

Table 2-8. Cumulative ROB Stock Turnover Based on a 16.2 Year Measure Life (% of total ROB stock)

2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
6.2%	12.0%	17.4%	22.6%	27.3%	31.8%	36.1%	40.0%	43.7%	47.2%

Source: Navigant, 2014

Table 2-9. Gas Savings Cumulative Achievable Potential as Percentage of ROB Stock Turnover (%)

2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
53.5%	56.4%	59.1%	61.6%	64.0%	66.2%	68.3%	70.3%	72.1%	73.8%

Source: Navigant, 2014

In response to GEC's comment about retrofit markets, Navigant notes that achievable potential for RET measures reaches 31.0 percent of the economic potential after only ten years (see Table 2-7). Based on the shape of that trajectory (which is still on the portion of the S-shaped curve with an increasing rate of change), it is very likely that the achievable potential for retrofit measures would reach GEC's 70-percent-after-20-years rule of thumb. Even if we make a conservative estimate and assume that another ten years of deployment would be symmetric to the first ten years, the RET achievable potential would be 62% of the economic potential, which is in the ballpark of the GEC's rule of thumb.

2.8 Definition of Technical Potential

Comment

You need to be careful about how you define technical potential. Note, for example, that the value for Residential Attic Insulation (p. 51) of about 40 million m3 is based on analysis of just one attic insulation measure (i.e. upgrading insulation levels only for homes with R-11 or less. In reality, technical potential for attic insulation should also include upgrading homes with R-19, and even homes with R-30. We have made this comment before. Those other starting points may not be "economic" to retrofit, but the potential is technically there. Moreover, it is not clear that at least the starting point of R-19 wouldn't be cost-effective under certain avoided cost assumption sensitivities. At a minimum, this must be made clear in

[1] This maximum fraction assumes that every customer presented with a replace-on-burnout decision will choose an efficient measure as the replacement.

[2] The stock turnover is based on a first-order exponential decay, whereby ROB measures fail at a rate equal to (CurrentStock / Lifetime) each year.

the caveat/limitations discussion in the report. This is also about the adequacy of the candidate measure lists.

Response

Navigant agrees that there may be other non-economic savings which are technically possible if the list of measures included in the analysis were expanded. As the comment points out, if we identified every possible level of attic insulation rather than those on the OEB-approved measure list the technical potential could be higher. We expect that there are a number of measures which may not be economic, such as increasing wall insulation to R40 or quadruple pane windows – which are technically possible but not included in the analysis. As the report states, the Technical Potential reported is based on the list of measures selected for this study. That measure list is not intended to be all inclusive but rather includes those measures currently approved by the OEB or deemed likely to offer material savings over the study period. We would not expect inclusion of additional combinations of measures to materially influence the overall results of the study, however, as discussed in Section 1.1.

2.9 Measure List and Monetary Benefits

Comment

As GEC stated in previous comments on the draft technical/economic results, the fact that economic potential in the commercial and industrial sectors is 96% of technical potential 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. 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. We know that Enbridge asked for feedback on the measures list, and that you didn't get a lot of feedback because of constraints faced by various parties, including GEC, at the time the feedback was requested. However, you hired a professional firm to do this work and it is reasonable to have expected them to come up with a fuller list (i.e. commenters should not have been expected to fill in large portions of the supply curve). One might suggest that the omission of measures above the current cost-effectiveness threshold shouldn't be too concerning since we wouldn't want to pursue them anyway. However, when a more balanced TRC test including avoided T&D costs, avoided carbon emissions, non-energy benefits and price suppression effects are added, the potential from a more complete measures list might have been very different. Moreover, this study is supposed to have some shelf life and be useful if our sense of avoided costs changes in the next year or two. While we don't expect Enbridge/Navigant to overhaul the study to more fully assess a range of measures at this point in the process, it seems critical to us that – at a minimum – the limitations discussed here be clearly articulated in the report.

Response

Please refer to the response offered in Sections 0and 1.2 .

2.10 Avoided Distribution Costs

Comment

We have several concerns about the sensitivity analyses that look at the impacts of adding additional benefits to TRC screening:

- *First, there is no reason for avoided T&D costs to be part of a sensitivity analysis. They should always be a fundamental part of avoided costs. The fact that they are treated as a "sensitivity" – i.e. as if they are optional or may or may not be benefits worth considering – is contrary to all guidance provided by the Board as well as standard industry practice. We suggest they be integrated into the Base Case analysis.*
- *There is no discussion of how the avoided T&D costs were developed. They seem extremely low. Is there a report supporting how these values were derived?*

Response

Please refer to the response offered in Section 1.2 . In addition, we note that per the RFP, which was reviewed and commented on by intervenors, avoided distribution costs were included only as a sensitivity analysis, rather than the base case. We note that the impact of adding distribution costs is very small – roughly a 0.5% increase in economic potential. However, to help intervenors understand the impact of avoided distribution costs and a 15% non-energy benefits adder, we conducted additional sensitivity analysis on achievable potential, and provided that additional information in the updated report. That information can be found in Section 5.4.4.

Additionally, we note that the source of the values for avoided distribution costs is a separate report, which contains detail regarding the methodology and assumptions. This report was prepared by Navigant as part of another study and involved Enbridge staff in gas supply, engineering, and DSM. Enbridge has advised that this report will be filed with the OEB as part of their multi-year DSM plan.

2.11 Price Suppression Effects

Comment

There is no sensitivity analysis including the potential benefits of price suppression effects (both on direct gas purchases and on electricity costs resulting from use of gas power plants on the margin). At a minimum, we would suggest that sensitivities looking at the magnitude of the effects estimated in the New England avoided cost study and perhaps ½ of the impacts estimated in the New England study would be appropriate. We aren't suggesting those values would apply necessarily to Enbridge, as the gas markets are different. However, the New England values would at least provide a likely outer bound for such benefits in Ontario. This could be made clear in discussion of the results.

Response

Please see the response to the overarching comment in Section 1.2 . Investigating the effect of price suppression was not in the project scope per the RFP reviewed and commented on by intervenors. Such investigation would require considerable additional study. However, we expect that the sensitivity analyses conducted elsewhere (e.g., inclusion of a 15% adder due to non-energy benefits, carbon tax scenarios, TRC threshold reduction scenarios) provide a reasonable range of expected changes to economic and achievable potential for benefits not explicitly considered.

2.12 Combine Sensitivity Analyses

Comment

There should be a sensitivity analysis that includes quantification of all of these additional benefits, rather than just looking at them one at a time.

Response

Please see the response to the overarching comment in Section 1.2 . Additionally, in an attempt to address this concern, we have added in Section 5.4.4 of the revised report a sensitivity analysis on achievable potential of looking at the combined impact of avoided distribution costs and 15% NEBs on achievable potential.

2.13 Need for Higher Cost Conservation Opportunities

Comment

> *The conclusion in the draft study that even when using somewhat higher avoided costs the economic potential does not increase by much is consistent with the use of the existing measures list – it's a self-fulfilling outcome. When savings are worth more, then higher cost conservation opportunities need to be examined. If they aren't examined then further cost-effective savings potential won't be found.*

Response

Please refer to the response offered in Section 1.2 .

2.14 Inclusion of DSM in Natural Gas Sales Forecasts

Comment

> *P. x: the report explains that Navigant adjusted its natural gas forecast "based on the historic change in natural gas intensity" (and other factors). It then suggests that this results in a forecast that "includes likely effects of natural conservation". In adjusting for historic change in natural gas intensity, did Navigant first adjust historical values to remove the effects of past DSM? If not, then the forecast would appear to be problematic. An efficiency potential study needs to estimate savings relative to a baseline of no programs. Since Enbridge has been running DSM programs for two decades, any extrapolation from past sales would – if not adjusted – include not only natural conservation but also implicitly include some continued DSM. This should either be corrected in the final version, or discussed as a shortcoming in the text.*

Response

The forecast is used to establish a base level of building stocks which are used to estimate changes in stock levels over the modelled period. Navigant did not adjust the historical values to remove the past effects of DSM programs. In our experience, attempting to estimate what past consumption would have been absent programs would have introduced significant uncertainty. We agree it would be appropriate to describe the baseline as including "*likely effects of natural conservation and past DSM programs.*" While we agree that it would be ideal to tease out the impact of past DSM programs, we consider this type of analysis to be highly uncertain, and expect that the overall impact on the study results is very small (and certainly within the overall uncertainty range of the study output).

2.15 Gross Savings Potential

Comment

> *P. xi: the statement that "all savings reported in this study are gross" is in conflict with the suggestion that the base case forecast includes the effects of natural conservation. Put another way, to the extent that future gas sales are assumed to be lower in the base forecast because some customers would have installed efficiency measures on their own, you are – by definition – not capturing all gross savings potential.*

Response

Please see response to comment 2.14 . We do not believe that adjusting the base case forecast to take past DSM programs into account would result in a material change to the projected stock of equipment and buildings used to estimate the energy efficiency potential. To the extent that such an adjustment would have resulted in a lower estimate of stocks, the resulting efficiency potential estimate would have been reduced.

2.16 Forecasting Limitations

Comment

> *Pp. 1-2: the discussion of "forecasting limitations" does not address the comment Chris has previously made that one inherent conservatism in potential studies is that they do not – indeed cannot – account for new technologies and/or new program approaches. Given the other caveats offered in this section, this is a problematic omission.*

Response

The difficulty in predicting the emergence of new technologies is one reason that these studies are typically conducted on a periodic basis. While we have in other studies included a detailed analysis (including the effect of the high degree of uncertainty on the likely savings from emerging measures), we did not do so in this study due to schedule and budget constraints. We have, however, added a caveat to this effect in the revised report to address the concern raised.

2.17 Residential Natural Gas Intensity

Comment

> *P. 12: the graph of residential natural gas intensity appears to include the effects of efficiency programs over the time-period analyzed. Shouldn't those be removed to show what this looks like absent DSM? Furthermore, we would argue that the values for water heating and space heating look pretty flat from about 1998 to present, except for the downturn in 2009, which could be argued is a reaction to the economic downturn rather than something more permanent. How was this addressed? Also, are the values in this table weather-normalized? If not, shouldn't they be?*

Response

The graph and figure showing trends in residential and commercial natural gas intensity are based on information obtained from Natural Resources Canada (as referenced in the report). As such they reflect actual use over the period per household or per unit of floor area. These intensities reflect a number of factors, including past DSM programs impacts, natural conservation, changes in codes and standards and changing trends in floor area of homes, floor area per employee in commercial buildings and economic trends as mentioned in the comment. Natural Resources Canada does provide some analysis of these changes in their Energy Efficiency Trends Analysis reports. Weather effects are taken into account in the residential and commercial sectors.

Per our response to comment 2.14 , Navigant recognizes that the inclusion of past DSM programs in these intensity changes is always an issue, but we do not believe that it significantly impacts the estimates of stocks that are used to estimate future potential.

2.18 Commercial Natural Gas Intensity

Comment

P. 13: are the values in the table on changes in energy intensity in the commercial sector net of DSM effects (i.e. excluding historical DSM impacts)? If not, doesn't the use of these values produce a false sense of a future without DSM, which should be the baseline forecast against which a potential study compares itself?

Response

Please see the response to comment 2.17

2.19 Building Stock Demolition Rate

Comment

P. 13: what is the commercial building stock demolition rate of 0.5%/year based on?

Response

This input is based on engineering judgment and corresponds with an average building lifetime of 200 years (1/0.5%), which is deemed to be a conservatively high building lifetime estimate.

2.20 OEB Measure Characterizations

Comment

P. 14, footnote 7: says that the report relied on the 2009 Navigant measure characterizations filed with the OEB. However, some of those assumptions have been updated since then. Did the report really rely on the 2009 Navigant work or did it instead use the most recently filed utility assumptions? If the former, this should be corrected. If the latter, then the footnote requires clarification.

Response

Navigant used the most current assumptions (EB-2013-0430 filed on April 30, 2014) for the OEB-approved measures and will revise the footnote in the report to clarify.

2.21 Cross-Cutting/Behavioral Measures

Comment

*P. 48: the commercial technical potential over 10 years is 26% (p. 35). Figure 3-9 suggests that about 12% of that is "cross-cutting/behavioral". We're not sure what "cross-cutting" means, or how it is different than "behavioral". In any case, this would seem to suggest that the max technical potential from behavioral changes is about 3% of commercial load (26% * 12% = 3.1%). Are you really saying that is the maximum technically possible? Seems hard to believe it is that low.*

Response

"Cross-cutting simply implies a measure that cuts across multiple end use categories. Behavioural is a subset of cross-cutting measures that refer to conservation opportunities driven primarily by behavioral changes. Please refer to Section 3.6 for discussion regarding the magnitude of savings potential.

2.22 *Carbon Intensity of Electric Grid*

Comment

P. 76, footnote 21: you cite the Environmental Commissioner's report on the average carbon intensity of the current electric grid. However, that is an average number. You should be using the marginal emission rate not the average, as what is on the margin is what would run less with more efficiency. You aren't going to run carbon-free hydro or nuclear plants less.

Response

In many North American jurisdictions average system emissions are higher than the marginal rate of emissions. In these circumstances, use of the average emissions for the system overstates GHG reductions. In Ontario this is no longer the case as the phase out of Ontario's coal plants has reduced average emissions below the level of a combined cycle plant and the marginal emission rate is expected to be zero in a significant number of hours each year. Under these changing circumstances use of the average emission rate was deemed to be appropriate. As noted in response to comment 2.27 a number of measures resulted in increased electricity consumption. In these cases, an increase in the emission rate would result in these measures being less economic.

2.23 *Example of Market Diffusion*

Comment

Pp. 83-84: the discussion of how Navigant got to achievable market penetrations is still pretty opaque. Put another way, it is not clear how changes in assumed financial incentive levels and assumed levels of marketing were estimated to impact market penetration rates. It would be enormously helpful if you could provide a single example where you show how the various assumptions lead to different market penetration rates at different levels of incentives and marketing efforts for a particular measure/technology (e.g. commercial condensing boilers or residential attic insulation).

Response

Please refer to the response offered in Section 0. In addition, for more detail on the approach, we recommend visiting Navigant's online technology adoption simulator, which can be found at: http://forio.com/simulate/navigantsimulations/technology-diffusion-simulation/overview/.

2.24 *Payback Acceptance Curves*

Comment

P. 83: the discussion of payback acceptance missing a key point: that market penetrations for many measures (at least those that are time-of-replacement equipment measures) are driven largely by HVAC contractor and other market players' stocking and sales practices. It also implicitly ignores the potential for upstream incentive programs which are more and more commonly being used by leading jurisdictions to achieve greater savings at lower cost. Furthermore, how can this approach deal with the large market segments where the split incentive is the main market barrier?

Response

Please refer to the response offered in Section 0. Additionally, we note that the payback acceptance curve approach is independent of the delivery mechanism (e.g., upstream versus rebate programs) and actually is more likely to be on the high side of the savings potential, in that it does not fully account for non-economic barriers to adoption. Thus, we consider that a more full accounting of all possible adoption barriers is more likely to decrease the savings estimate than increase it, contrary to what is suggested above.

2.25 Market Acceptance of C&I Measures

Comment

> *P. 84: we're confused by Figure 5-1. Are you really saying that ~75% of commercial and industrial efficiency measures would be purchased if they had a payback of 3 years?*

Response

That statement would be true with the caveat that it assumes customers have perfect information and awareness about the benefits of the efficient measures. They typically do not, which is one reason market shares are often much lower in the absence of efficiency programs. One of the objectives of efficiency programs is to overcome those barriers to adoption by improving the awareness of customers regarding the benefits and economics of efficient technologies. Navigant's DSMSim model has an endogenous calculation of the increase in awareness over time (which suppresses the market share relative to the perfect awareness assumption), through both program marketing and customer word-of-mouth mechanisms (see Section 5.1.2 of the report).

Comment

> *That is clearly in conflict with everything we know about how often C&I audits find large, untapped savings potential with very short paybacks. Put simply, we have grave concerns about the kind of formulaic approach to assumptions about market penetration that appears to be implicit in this study. Experience with DSM in numerous jurisdictions clearly suggests things just don't work that way. It would be much better to develop market penetration assumptions, market by market, based on experience in other leading DSM jurisdictions with similar markets.*

Response

Please refer to the response offered in Section 0and the response to the first part of the question offered above. In addition, we note that the suggestion that developing market penetration assumption based on experience and judgment is fraught with its own uncertainties, and it is not clear to us that such an approach is superior to that used in this study or that such an approach is best practice. Additionally, the suggested approach comes with its own limitations in estimating the types of supply curves (e.g., savings versus budget), including estimating the effects of various incentive levels, that we have provided as part of this study.

2.26 Cost Terminology

Comment

> *P. 112: the report refers to 27% of DSM costs being "administrative". Do you really mean "non-incentive costs"? In other words, are you using the term "administrative" to encompass all non-incentive costs including admin, marketing, training, other technical support, market transformation, evaluation, etc.? If*

so, you should make that clear and/or change your terminology as many people will otherwise have misconceptions about what this means.

Response

We do indeed consider the "administrative" cost category to be all non-incentive costs. We have added a clarifying statement in footnote 31 of the revised report.

2.27 Line Loss Rates

Comment

P. B-2: as noted in previous comments, the electric line loss rate of 4.8% is problematic. Even if that is the average loss rate, marginal losses – which are what really matters – will be about 150% of average losses; marginal peak losses will be 250% to 300% of average losses (see Jim Lazar paper published by the Regulatory Assistance Project).

Response

The electric line losses represent average line losses for the Toronto and Ottawa systems. It should be noted that for a number of measures electricity use increases under the efficiency case. Line loss values may of course be higher under certain weather or loading conditions, however, there is no reason to expect that this would be the case for most of the measures modelled. Given that the bulk of the energy savings in the study are from natural gas rather than electricity, we don't believe that refining the loss factor for electric savings would materially alter the results of the analysis.

2.28 Savings as Percent of Sales in 2012

Comment

P. E-7: we are surprised by the estimate that Enbridge's 2012 savings were 0.9% of sales. Our understanding was that the % was considerably lower than that. In table E-3, the total sales were estimated at 10.4 billion m3. Our data suggest it was 11.3 billion (see: EB-2012-0451 Exhibit I.A4.edg.gec.34). Also, we thought that annual or first year savings were considerably lower than the 92.5 million m3 shown in the table – more like 60 million m3. Thus, we think that Enbridge's 2012 savings were more like 0.5% of sales. What are the references for the values used in the study? Are these gross savings values rather than net? If so, that is not clear in the report. Moreover, it is highly problematic as Enbridge's programs have very high free rider rates as a result, in our view, of a highly cream-skimming approach in key markets. This is evident in the spending levels being so low.

Response

The above comment above is addressed by noting that we are only reporting gross savings, not net. Please refer to Section ES.2.4, which states:

> *"All savings reported in this study are gross, rather than net, meaning that the effect of possible free ridership is not included in the reported savings, per Enbridge's guidance and for consistency with past studies. Gross savings, rather than net, are included in this report for a number of reasons. First, there was a desire that the results of this report be compatible with different net-to-gross (NTG) assumptions in the future, permitting separate calculation of net results as NTG assumptions are updated. Second, there was a desire to be able to easily compare the results of this study with the prior potential study conducted by Marbek, which also reported only gross savings. Third, NTG assumptions can change with different*

> *assumptions regarding the program design, which is a scope that is outside of this study. Enbridge plans to calculate net savings separately, post study completion.*

We agree that this could be clearer in the benchmarking appendix, however, and have also therefore added clarifying text in that section, with some caveats.

2.29 *End Use Tables in Section 3*

Comment

> *Tables 3-10 and 4-10 should be comparable we think, but with 4-10 showing lower results since it is economic potential rather than technical potential. Why does 4-10 show far higher values? It seems like 3-10 is missing a row of data.*

Response:

Tables in Section 3 showing technical potential by end use were incorrectly inserted into the draft report. The residential sector showed tables from a previous draft. All others were improperly labeled, such that the low income table was actually for the residential sector, etc. This error has been corrected in the revised draft.

2.30 *Residential Air Sealing*

Comment

> *We agree with Dana's observation that residential air sealing is poorly characterized in the study when treated as a low cost DIY kit with savings lasting only 1 year. The annual savings used may be reasonable but can only be achieved with higher costs ($300 to 400?) and would enjoy a long measure life. We think the Weatherization program is using 25 years when draftproofing is done with proper materials by contractors.*

Response

As indicated in the report, Navigant relied on the list of OEB-approved measures, using the most current characterization of those measures. We agree that the cost estimate for this measure is likely low, though we consider the savings to be reasonable. Thus, for a given budget level, savings may be slightly overestimated, all else equal, given this concern. Since the measure passed cost effectiveness, the assumed lifetime has no bearing on the results provided (other than a very small impact on the total sector and portfolio level cumulative cubic meter values provided in the appendix).

2.31 *Residential Windows* **Enbridge-characterized measure)**

Responses to comments in this section have been provided to Navigant by Enbridge, who characterized this measure.

Comment

> *Appendix C, Residential Triple-Glazed, Low-E, Argon windows:*
>
> - *There are two different measures characterized for both new construction and existing homes. One has a source that says "LEEP Ottawa 2014 Information Package" and the other – with lower savings and lower costs – says "LEEP Ottawa 2014 Information Package, Marbek 2008 Report". Which of these*

was used? The documentation you previously provided us suggested it was the non Marbec one. Is that the one that was used? What is the difference?

Enbridge Response

In preparing the assumptions for this measure, in some cases Enbridge used data from BOTH the 2009 Marbek Study and NRCan's 2014 Local Energy Efficiency Partnership (LEEP) Information Package. The Information package was provided in a binder to participants/sponsors of NRCan's 2014 Ottawa LEEP sessions, which has not been made available to the public. The cost and savings sources referenced in Columns L & P respectively in Measure Characterization Spreadsheet (Appendix C) will be updated. The 2008 Marbek report contained data on the incremental costs and energy savings for each of the 4 types of window measures:

- o Existing single detached and attached
- o New single detached and attached

The energy savings data and incremental costs from the LEEP Information Package was more up to date since it was prepared in 2014, but it only studied and reported energy savings and incremental costs for one type of window measure (detached new construction). Enbridge calculated incremental cost assumptions for the other 3 window measure types (i.e.: i) new townhouses & semi-detached, ii) existing detached & iii) existing townhouses and semi-detached) by applying adjustment factors to the value taken from the 2014 LEEP Information Package. These adjustment factors were based on information from the 2014 LEEP Information Package. Enbridge used the 2014 LEEP Information Package for the energy savings for detached homes.

Comment

- o *The increased electricity consumption of 255.3 kWh/year seems high. We have three questions on this:*
  - ▪ *It appears that this is related to an increase in cooling kWh. Is that right?*

Enbridge Response

That is correct, the increased electricity consumption is related to an increase in cooling kWh.

Comment

- ▪ *Assuming so, did the modeling that produced that value essentially assume that cooling occurs whenever the load on the house caused the temperature to exceed a thermostat setting (i.e. not adjusting for behavior related adjustments to cooling consumption)? If so, it would have overstated adverse cooling impacts, as modeling software is notorious for doing. In our experience, modeling estimate of cooling impacts need to be adjusted down by about 40% if the model isn't calibrated to actual cooling energy use values.*
- ▪ *Was the 255 kWh adjusted to account for the portion of Ontario homes that do not have central A/C? If not, it needs to be. NRCan data suggest that only about 60% of Ontario homes have central A/C (i.e. warranting another 40% reduction in the 255 value).*

- *Is the kWh impact net of reduced kWh from reduced furnace fan run time? If not, that adjustment also needs to be made (we would expect the furnace fan savings to be on the order of 50 to 100 kWh).*

Enbridge Response
The 2014 LEEP Information Package is not a comprehensive report, but rather it was presented as a fact sheet containing cost and savings data for each technology. Since there was no detailed back up information with respect to modelling and how the numbers were determined, Enbridge is unable to comment on whether the increased cooling is overstated. Enbridge did not factor in the proportion of Ontario homes that do not have central A/C or kWh impact from reduced furnace fan run time.

2.32 *Assumed Discount Rate*

On January 7, 2015, Chris Neme provided the following additional comment in an email to Enbridge.

Comment

> *The recently released Board guidelines suggest that the appropriate discount rate to use in screening is 4%, rather than the 7% that was used in the study to date. Could you please have Navigant use that rate in their revisions to their work?*

Response

> Navigant notes that unfortunately it is unable to accommodate this recent change to guidelines regarding the discount rate. Such a change would ripple through the entire document, as it would affect every economic and achievable output as well as all sensitivity analyses. We rather suggest that intervenors look to the sensitivity analyses already provided to assess the range of possible outcomes. For instance, the sensitivity analysis conducted on achievable potential of adding distribution costs and a 15% non-energy benefits adder to avoided costs is likely to have an effect of comparable magnitude.

3. Jack Gibbons Comments

On December 8, 2014, Jack Gibbons sent an email to Enbridge that included several comments. Those comments are addressed in the following sections.

3.1 *Net Benefits*

Comment

> *Please calculate the total net TRC benefits that would be produced by Enbridge's status quo DSM budget by 2024.*
>
> *Please calculate the total net TRC benefits that would be produced by a DSM budget of $212.8 million per year for 10 years.*

Response
Please see Sections 5.3.3, 5.4.1 and 5.4.2 of the revised report for net benefits for the base case budget, the budget sensitivity analysis and the TRC sensitivity analysis.

3.2 Upper Bound on Achievable Potential

Comment

Please calculate the annual DSM budgets that would be needed to achieve 75%, 90% and 100% of all cost-effective DSM by 2024. For each budget scenario please calculate the average TRC benefit/cost ratio and the total net TRC benefits.

Response

To explore this question, Navigant fully incentivized every measure to bring the participant costs down to zero, and we used marketing effectiveness parameters on the highest end of the realistic range of values. This scenario was intended to test the maximum achievable potential that could be attained based on realistic product diffusion assumptions. The results indicated that 54% of the cost-effective potential could be achieved at an average annual budget of $266 million. For comparison, as shown in Table 2.5 presented herein, the base scenario is expected to achieve 31.2% of the cost-effective potential with an annual average budget of $35 million. Ultimately, stock turnover and limitations on marketing effectiveness prevent greater adoption of efficient measures over this 10-year simulation horizon even under the most aggressive incentive scenario.

3.3 Greenhouse Gas Emissions

Comment

For each of the above DSM budget scenarios please calculate the GHG reductions in 2020 and 2025.

Response

Table 3-1 and Table 3-2 provide the cumulative first-year CO2 emissions reductions for the budget sensitivity analyses presented in the Section 5.4.1 of the draft report and for the TRC sensitivity analyses presented in Section 5.4.2.

Table 3-1. Cumulative First-Year CO2 Emissions Reductions Corresponding to Section 5.4.1 Budget Scenarios (million tonnes CO2/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
A	0.17	0.34	0.51	0.69	0.86	1.04	1.21	1.39	1.57	1.75	9.53
Base Case	0.18	0.36	0.54	0.72	0.90	1.09	1.27	1.45	1.64	1.82	9.96
C	0.19	0.37	0.56	0.75	0.94	1.13	1.32	1.51	1.70	1.89	10.34
D	0.19	0.39	0.58	0.78	0.97	1.17	1.37	1.56	1.76	1.95	10.72
E	0.20	0.40	0.60	0.81	1.01	1.21	1.42	1.62	1.82	2.02	11.11
F	0.21	0.42	0.63	0.84	1.05	1.26	1.47	1.68	1.88	2.08	11.51
G	0.22	0.43	0.65	0.87	1.09	1.30	1.52	1.73	1.94	2.15	11.90
H	0.22	0.45	0.67	0.90	1.12	1.35	1.57	1.79	2.00	2.22	12.30
I	0.23	0.46	0.70	0.93	1.16	1.39	1.62	1.85	2.07	2.28	12.70
J	0.24	0.48	0.72	0.96	1.20	1.44	1.68	1.91	2.14	2.36	13.14
K	0.26	0.52	0.78	1.05	1.31	1.57	1.83	2.08	2.33	2.57	14.30
L	0.28	0.56	0.85	1.13	1.42	1.70	1.98	2.25	2.52	2.78	15.46

Source: Navigant, 2014

Table 3-2. Cumulative First-Year CO2 Emissions Reductions Corresponding to Section 5.4.2 TRC Sensitivity Scenarios (million tonnes CO2/year)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
A	0.17	0.35	0.52	0.70	0.88	1.06	1.24	1.42	1.60	1.78	9.73
Base Case	0.18	0.37	0.55	0.74	0.92	1.11	1.30	1.49	1.68	1.87	10.21
C	0.19	0.38	0.57	0.77	0.96	1.16	1.36	1.55	1.75	1.94	10.63
D	0.20	0.40	0.60	0.80	1.00	1.21	1.41	1.62	1.82	2.02	11.08
E	0.21	0.42	0.62	0.83	1.05	1.26	1.47	1.68	1.89	2.09	11.52
F	0.22	0.43	0.65	0.87	1.09	1.31	1.53	1.75	1.96	2.17	11.98
G	0.23	0.45	0.68	0.90	1.13	1.36	1.59	1.81	2.03	2.25	12.43
H	0.23	0.47	0.70	0.94	1.18	1.41	1.64	1.87	2.10	2.32	12.87
I	0.24	0.49	0.73	0.97	1.22	1.46	1.70	1.94	2.17	2.39	13.31
J	0.25	0.50	0.76	1.01	1.27	1.52	1.77	2.02	2.26	2.49	13.85
K	0.28	0.55	0.83	1.11	1.39	1.67	1.94	2.21	2.47	2.73	15.16
L	0.30	0.60	0.90	1.21	1.51	1.81	2.11	2.40	2.69	2.97	16.51

Source: Navigant, 2014

3.4 *Enbridge Distribution Volumes*

Comment

For each of the above DSM budget scenarios please calculate Enbridge's annual distribution volumes for each year to 2025 inclusive.

Response

Forecasts of Enbridge's distribution volumes are deemed to be more appropriately provided by Enbridge in conjunction with formal forecasting and resource planning processes and are considered to be outside the scope of this analysis, considering that EE/DSM potential is just one element of such a forecast. Enbridge has advised that the most recent volume forecast is contained in its 2015 rate application: EB-2014-0276, Exhibit C3, Tab 2, Schedule 1, column 2.

On December 7, 2014, Jack Gibbons forwarded an email to Enbridge subsequent to requesting input from Ian Jarvis. Those comments are addressed in the following two sections (3.5 and 3.6).

3.5 *Amount of DSM Potential*

Comment

Comparing the proposed potential for the commercial sector on page 48 with our evidence submitted during the 2013 pipeline hearings suggests the total DSM potential is substantially larger than Navigant indicates.

Response

Please see the response offered in Section 1.1.

3.6 Operational Improvements Measure

Comment

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

Response

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

4. Jay Shepherd Comments

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

4.1 Cumulative Cubic Meters vs. First-Year Savings Potential

Comment

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

Response

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

4.2 Non-Optimal Acquisition

Comment

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

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

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

Navigant reviewed the results and acknowledged that the marginal acquisition costs (in $\$/m^3$/year) were not monotonically increasing with the budget levels. Further exploration revealed that the marketing effectiveness parameters, which impact the adoption of efficient measures in the achievable potential calculations, were not ramping linearly as a function of the budget scenarios as Navigant originally intended. The non-linearity of marketing effectiveness parameters led to situations where the increase in adoption due to marketing (a lower cost strategy) outpaced the increase in adoption due to incentives (a higher cost strategy), which resulted in marginal acquisition costs that did not always increase as a function of higher budget levels.

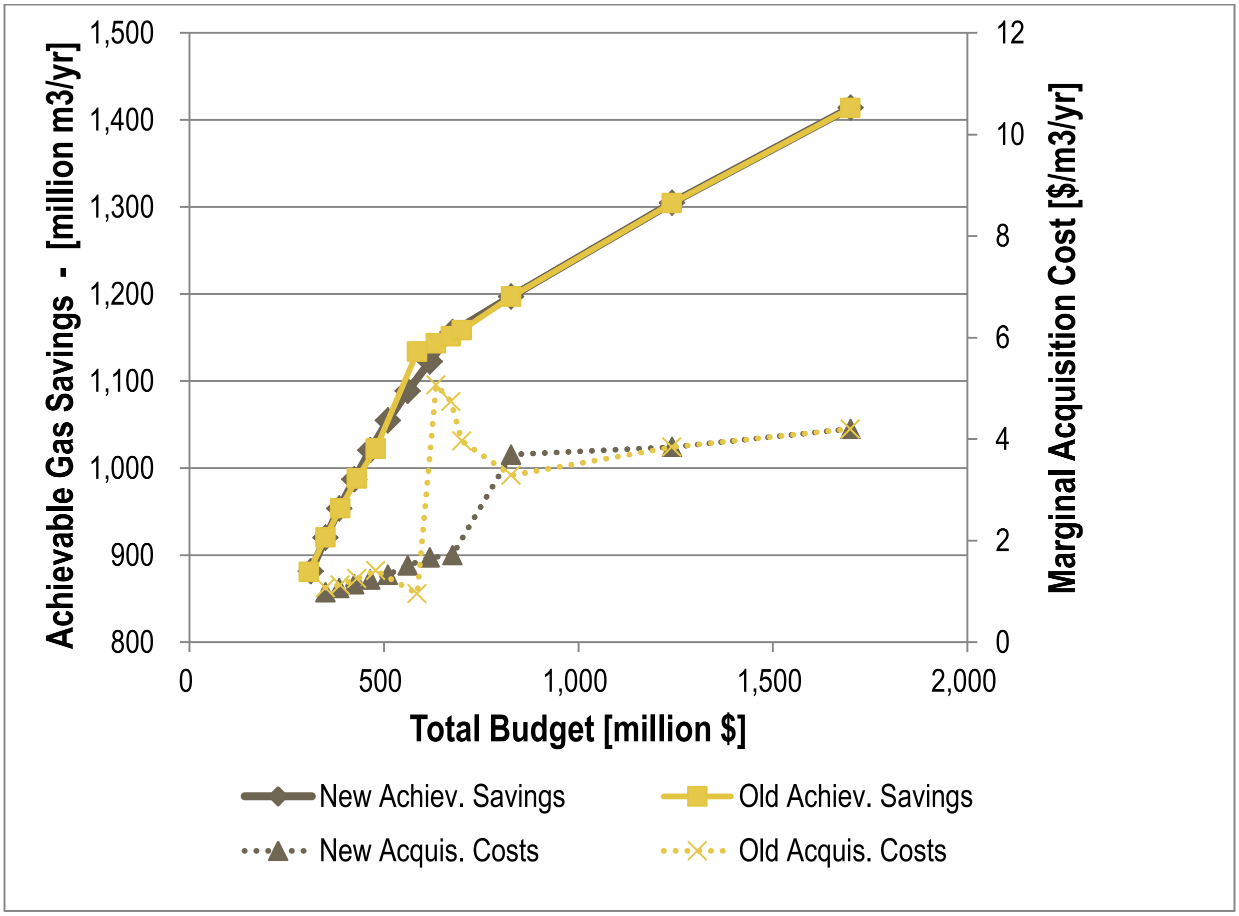
Navigant has remedied this issue by ensuring that marketing effectiveness parameters ramp linearly as a function of budget levels for scenarios A through I (marketing effectiveness has reached its highest realistic value by Scenario I and is held constant for the remaining scenarios). This change to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

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

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

Source: Navigant, 2014

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



Source: Navigant, 2014

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

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

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

Source: Navigant, 2014

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4.3 TRC Screening Thresholds

Comment

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

Response

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

4.4 Administrative Costs

Comment

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

Response

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

4.5 Market Transformation Costs

Comment

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

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Response

Market transformation costs, provided by Enbridge, were included in the study to ensure that this important budget category was not excluded from the budget analyses, which provided expected savings levels for various budget scenarios. However, there are no "impacts" of market transformation activities estimated in the analysis; they only represent a cost.

4.6 Natural Market Adoption

Comment

> *I was disappointed that there was little analysis of the interaction between the natural adoption of measures shown on Fig. 5-1, at page 84, and the forecasts of achievable potential. This appeared to show that more than 50% of measures with a five year or less payback will be adopted in industrial and commercial without any utility intervention at all, and even a significant percentage of 10 year paybacks. (Is it possible that we are looking at net to gross all wrong, and we should be driven by payback curves, not surveys?) This may be just my lack of technical expertise in the field, but I would have liked to understand better how the adoption curves drive the achievable potential assumptions, i.e. how does the model work in fact?*

Response

We note that the concern raised (e.g., that payback curves tend to have higher assumed market share for a given payback level) would tend to result in higher, not lower, estimates of achievable potential for any given budget level. Since all values provided in this study are “gross” (independent of free ridership), the market share shown on the payback curves is directly proportional to the estimated achievable potential for any given measure. If the curves were more conservative (i.e., showing lower market share as a function of payback time), forecast achievable potential for any given incentive/budget level would be reduced. The effect on “net” savings (inclusive of free riders) is a more complex analysis, is dependent on the program delivery mechanism, and is outside the scope of this study. For additional insight into the modeling dynamics, we'd also encourage you to visit Navigant's high level online technology adoption simulator, which provides a simplified representation of our method for forecasting technology adoption. This simulator can be found at http://forio.com/simulate/navigantsimulations/technology-diffusion-simulation/overview/.

5. Dana Silk Comments

On December 9, 2014, Dana Silk sent an email to Enbridge that included several comments. Those comments are addressed in the following sections.

5.1 Limitations on Achievable Potential

Comment

> *I believe the most useful part of the Study, which you highlighted last week, is the graph showing the various levels of potential. The Technical potential is impressive but the Achievable potential is depressing. Unfortunately, apart from low NG prices, I could not find any analysis of how to break through the glass ceiling that keeps the Achievable potential so low and no suggestions on how to shatter the crystal ceiling*

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blocking access to the Technical potential. I guess we missed that in the consideration of the Terms of Reference. Must we conclude that this is proprietary information in the DSMSim model?

Response

Please refer to the response offered in Section 0.

5.2 Air Sealing and Other DIY Measures

Comment

If so, one of the few leaks is Footnote 18, which acknowledges that the second-largest residential measure for Economic gas savings relies on the OEB approved "do-it-yourself kit". Having considerable experience in both DIY and professional airsealing (including providing one of Ontario's leading insulation contractors with both a blower door and a financial incentive based on measured results), I can attest that the DIY kits pale by comparison. So I am a little skeptical about the Economic potential identified, and if one of the measures I know quite well is over-rated, what does that say for the others for which we have very little information on how the potential was reached?

Response

Please refer to the response offered in Section 2.30 (page 20).

5.3 Additional Avoided Costs and Benefits

Comment

Although it was good that Enbridge asked Navigant to show what would happen if the Ontario MOE 15% adder directive to LDCs were applied to NG utilities, it begs the question why the Study did not consider a more significant adder or equivalent that will almost certainly be directed by a government between now and 2024 as climate change policies take effect. Is there not a utility out there that has made the link between DSM and GHG? I'm sure Navigant would say that was not part of the contract but it could still add a couple of paragraphs to respect Enbridge's Climate Change Policy commitment to Share information on current and emerging "best-available technologies economically achievable" and partner with key stakeholders to ensure governments are aware of, and understand, these technologies. Co-generation (especially micro) and district heating come to mind as does on-bill financing and partnering with governments to overcome the barriers facing small businesses who want to invest in better HVAC units by financing them through Local Improvement Charges tied to the property, instead of giving them to landlords.

Response

Please refer to the response offered in Section 0.

5.4 CO2 Price Levels

Comment

I note that the highest carbon tax used ($60/tonne) is not really that high, especially for 2024. The Economist concluded that the BC tax of about $25 needs to be four times higher to make a real difference and Sweden started with a $133 (US) tax, that has since been modified according to sector but the standard rate is currently at $105 (US).

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Response

Please refer to the response offered in Section 0. Additionally, we add that the carbon taxes assumed in the sensitivity analysis are intended to be more in line with those likely to be seen in the near future, as opposed those deemed to be "required" to achieve maximum acquisition of conservation. If the reader desires a more extreme scenario for achievable potential, we invite you to explore the scenarios offered in Section 5.4.2 of the report, which provide an estimate of savings potential if the TRC threshold were dramatically reduced (which has a similar effect on savings as increasing the carbon taxes assumed).

5.5 Technology and Market Uncertainty

Comment

> *As it stands, the Study is certainly solid, but almost solidly old school, focussing as it does on past trends and current technologies. It's too bad that there was no consideration of emerging technologies or volatile economic factors and no speculation about possible paradigm shifts over the next decade linked to climate change. In hindsight, restricting the analysis to OEB approved measures clearly undermined Enbridge's commitment to ensure governments (including the OEB) are aware of, and understand emerging technologies, if not the potential impact of the "societal changes" alluded to in the Study.*

Response

Please refer to the response offered in Section 0.

6. Kai Millyard Comments

On December 9, 2014, Kai Millyard sent an email to Enbridge that included several comments. Those comments are addressed in the following sections.

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6.1 Technology and Market Uncertainty

Comment

Would it be possible to provide a similar spreadsheet but for each measure the participation counts or first year savings or market share (not sure how this metric is handled in the model) for these cases:

- base case/year
- technical potential
- economic potential
- achievable potential in each of the 6 years

As discussed last week, being able to see this for individual years rather than rolled up to a 6 year total would help see through the black box and understand how the results relate to existing programs and levels of effort.

Response

Navigant has provided the requested information for four distinct budget scenarios in a separate Excel file that accompanies this document.

Enbridge Gas Distribution Inc.

Integrated Resource Planning Study

Scope of Work

March 18, 2015

Table of Contents

STUDY SCOPE

The primary focus of this study is on the relationship between Demand Side Management ("DSM") and infrastructure planning. The study will examine the three areas where DSM could potentially impact infrastructure planning:

- Broad-based DSM impacts and planning forecasts of infrastructure investment (Passive Deferral)
- Potential direct impact of DSM on subdivision planning through an expanded role by the utility in municipal planning (New System Design)
- Potential direct impact through targeted DSM to achieve deferral of reinforcement projects (Active Deferral)

It is important to note that broad-based DSM and Distribution Planning operate from different viewpoints. The primary objective of broad-based DSM is to obtain participant and societal savings through a reduction in annual consumption of natural gas across the Enbridge Gas Distribution Inc. ("Enbridge") franchise area. In the process the DSM programs will have an indirect impact on the need for distribution infrastructure. This effect is sometimes referred to as "passive deferral of infrastructure" and will be captured starting in 2015 as a benefit in the Avoided Cost calculation used in the Total Resource Cost ("TRC") test to screen DSM programs. In contrast, Distribution Planning is concerned with maintaining the safety and integrity of the distribution system under all conditions, including a situation of maximum use. Distribution Planning looks at peak hour requirements in each network and sub network of the distribution system, based on the history of individual customer usage in that network and design day conditions. The objective of targeted DSM is "active deferral" of specific infrastructure projects.

For gas utilities, infrastructure planning is distinct from planning to meet gas supply needs. While gas supply planning is focused on sourcing sufficient gas to meet peak day needs across the franchise, distribution planning is focused on maintaining a distribution system which can meet peak hour needs in each and every network under a design conditions scenario. An important factor in the planning and design of pipe networks is the quantification of demand in terms of peak hour flow (m3/h). This is the metric by which the utility describes the hourly demand of any network or subset of customers on the system.

A key task of the study will be to examine the impacts of DSM on peak hour demand in the distribution system. Currently broad-based DSM efforts are known to impact average consumption of natural gas. However, the impacts of broad-based DSM on peak hour demand are not clear or proven. As well, there is only limited information (from the electricity sector) of the impacts of targeted DSM on peak hour demand in specific network areas.

STUDY APPROACH

The study will use the following steps to explore issues relating to each of the areas where DSM could potentially impact infrastructure planning:

- Identify key questions for each area to provide a framework for research and analysis,
- Develop and implement research methods and tools appropriate to addressing the questions,
- Analyze and synthesize the research results.

Research methods are expected to include:

- A review of internal Enbridge data on customers and DSM efforts,
- Primary research such as load research and market research based on industry best practices,
- secondary research such as a review of existing literature and prior study on the subject of IRP as well as jurisdictional scans of other relevant efforts across North America,
- Case studies in Enbridge's franchise area to synthesize and test research findings.

A key aspect of the study Approach will be the use of case studies in the Enbridge franchise area with respect to potential impacts on subdivision planning and deferral of reinforcement projects.

Working with real case study examples from Enbridge's franchise area will:

- Minimize lost opportunities by working directly with eligible projects,
- Facilitate testing of analytical methods by using real data and situations,
- Maximize available resources,
- Build directly towards a transition plan, and
- Inform changes to the utility's long term system planning processes and analysis based on tested experience.

METHOD

This section will outline the research methods to be used to "determine the appropriate role that DSM may be able to serve in future system planning efforts."[1] As noted in the discussion of Scope this study will focus on the three potential intersections of DSM and infrastructure planning:

1. Broad-based DSM and potential passive deferral of distribution infrastructure,
2. DSM opportunities in new subdivisions and potential alternative infrastructure plans,
3. Targeted DSM to achieve active deferral of infrastructure reinforcement projects.

Intersection #1: Broad-based DSM and Distribution Infrastructure planning

In considering the role that broad-based DSM might play in Distribution Planning, the key questions are:

- What information from broad-based DSM programs would be helpful to Distribution Planning?
- Could metering for DSM purposes also provide useful information for Distribution Planning?
- What are the implications of advanced DSM initiatives such as CHP for Distribution Planning?
- What changes would be needed to better integrate relevant broad-based DSM information into the Distribution Planning process?

Research Method - These questions will be addressed through:

- A Jurisdictional Scan and Literature Review,
- An Internal Review of the Enbridge Distribution Planning process and DSM program planning process,
- Primary Research – interviews with gas utilities with established broad-based DSM programs.

Intersection #2: Subdivision Planning

In the current municipal planning process, the utilities are brought in towards the end of the design process and tasked with servicing the development as designed. This represents a lost opportunity in terms of potential gas savings and optimum use of the resource at the level of the individual building or dwelling and also at the level of the neighbourhood or community.

Earlier participation by the builder / developer and their trades in Enbridge's Savings by Design programs leads to large reductions in natural gas usage per building as well as water and electricity savings. Similarly, early participation in the municipal planning process by all utilities can lead to collaborative design that may result in an overall increase in energy efficiency and potential changes to infrastructure design.

It should be noted that the need for distribution infrastructure in a new development cannot be deferred; a potential role for DSM in subdivision planning is more likely to result in fewer lost opportunities and a reduction in annual natural gas use with associated TRC benefits. It may also result in a more efficient configuration of energy infrastructure.

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[1] EB-2014-0134 Report of the Board Demand Side Management Framework for Natural Gas Distributors (2015 – 2020) December 22, 2014. Page 36

The key questions to be asked are:

- What is the current process of infrastructure planning for new subdivisions?
- Is a different, more proactive role for the utility in subdivision planning feasible?
- What would be the impact on infrastructure planning?
- What would be the impact on natural gas usage?

Research Method - These questions will be addressed through:

- An Internal Review of the Distribution Planning process for new developments,
- A Jurisdictional Scan / Literature Review re: alternate subdivision planning process,
- Primary Research re: current developments in community energy planning in Ontario,
- A possible Case Study or Pilot with a willing host municipality to test alternate approaches.

Intersection #3: Targeted DSM and Reinforcement Projects

With respect to targeted DSM and deferral of reinforcement projects, the key questions to be asked are:

1. Is it Technically Feasible? Can targeted DSM make a significant impact on peak hour?
2. Is it Possible?
    a. Could DSM programs be designed to achieve the necessary impact?
    b. How would this approach be integrated with Enbridge's planning and regulatory processes?
    c. What are the implications for metering?
3. What about Risk? As an alternative to reinforcement, could energy efficiency savings ensure system reliability?
4. Is it Cost Effective? Would targeted DSM to defer infrastructure reinforcement result in savings for ratepayers?

Addressing each of these questions will involve a combination of various research methods. To provide an overarching research focus, the issue of targeted DSM and reinforcement projects will be addressed through one or two case studies. All the individual research questions will be focused on data and modelling relating to the case study area(s).

Is it Technically Feasible?

Can targeted DSM make a significant impact on peak hour?

The central task of this portion of the research is to determine:

- the required load reduction necessary to defer the reinforcement project,
- the technical potential of eligible measures, i.e., their impact on peak hour.

Primary research will use data from Distribution Planning to determine the necessary load reduction in the case study area(s). The study team will develop a list of eligible DSM measures and their impact on peak hour. If necessary primary research could provide market penetration data of eligible measures for the case study area(s) and this data could be used to develop the technical potential if all eligible measures were installed. The resulting reduction in peak hour consumption will be compared with the required load reduction.

Method Summary: Primary Research and Analysis of data from the Case Study area(s)

Is it Possible?

a. Could DSM programs be designed to achieve the necessary impact?
b. How would this approach be integrated with Enbridge's planning and regulatory processes?
c. What are the implications for metering?

This section will provide the technical achievable potential and discuss implementation issues relating to the regulatory process and metering. Primary and secondary market research for the case study area(s) will be used to estimate customer acceptance and required incentive levels. A review of Enbridge's existing DSM programs and interruptible rates will provide additional insight into customer acceptance and incentives. This research and analysis will result in a sample targeted DSM portfolio for the area(s) showing anticipated peak load reduction – the technical achievable potential. As a final step, the technical achievable potential will be compared to the required load reduction.

This analysis will also include costs and timelines to implementation. (The cost estimates will include any additional costs for customer incentives and for EM&V). Using the technical achievable potential, the study will then discuss the impact of this approach on Enbridge's planning and regulatory processes and metering program.

Method Summary: Primary and Secondary Market Research, a Review of Enbridge's programs, and Analysis

What about Risk?

As an alternative to reinforcement, could energy efficiency savings ensure system reliability?

This portion of the research will determine whether the projected DSM peak load reductions meet the system reliability requirements of Distribution Planning in the current context of increasingly volatile consumption patterns. This will be accomplished through review of the regulatory and other requirements relating to the safety and integrity of the Distribution system and analysis to determine whether the potential peak load reductions achieved through DSM could meet those requirements. As well, this section will also consider escalation of reinforcement projects should planned DSM peak load reductions fail to materialize.

Method Summary: Secondary Research of risk requirements and Analysis

Is it Cost Effective?

Would targeted DSM to defer infrastructure reinforcement result in savings for ratepayers?

The first step in this section of the Study will be to develop an appropriate cost benefit test to analyze and compare the cost benefit of the demand and supply options using the information from the case study area(s).

Designing the cost benefit test will involve a jurisdictional review to discover the practices of other utilities that engage in targeted DSM for the purpose of infrastructure deferral. This section of the study will also include a review of the Ontario Energy Board (the “Board”) requirements regarding cost benefit testing of infrastructure projects and a review of the standard cost effectiveness tests used for broad-based DSM programs. Once the test is designed it will be applied to compare the demand and supply options of the case study or case studies.

Research Method Summary: Jurisdictional Review, Review of Board requirements, Design and Apply the Cost Benefit Test to the Case Study area(s)

TIMELINE

As recommended by the Board in the Framework document, the Study results will be available in advance of the Mid-term Review of the Multi-Year plan. The major activities and milestones in the course of the study are listed below.

April – December 2015 – Activity - Preliminary work (Gather information, Develop detailed work plan, Draft RFP).

October – December 2015 – Milestone – Board decision on Multi-year plan including IRP Study scope and method.

January 2016 – Milestone – Study commences

January 2016 – December 2017 – Activity – Conduct research, synthesis research results, produce report

December 2017 – Milestone – Study Report completed

PRELIMINARY TRANSITION PLAN

In addition to the requirement for the Study, the Framework stipulates that "As part of the multi-year DSM plan applications, the gas utilities should … 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."[2]

Enbridge "plans to begin to include DSM as part of its future infrastructure planning efforts" by developing and testing transition activities as part of the study of DSM and Infrastructure Planning. This will be done by using real examples of planned infrastructure projects as case studies in the research. The case study examples will be used to develop and test the method(s) by which the DSM alternative will be assessed.

As stated earlier, working with real case study examples from Enbridge's franchise area will:

- Minimize lost opportunities by working directly with eligible projects,
- Facilitate testing of analytical methods by using real data and situations,
- Maximize available resources,
- Build directly towards a transition plan, and
- Inform changes to the utility's long term system planning processes and analysis based on tested experience.

The case study areas will be selected from Enbridge's list of potential / prospective infrastructure projects and potentially other specific areas that will support data acquisition and analysis. As a first step, Enbridge will make an inventory of all prospective / potential infrastructure projects currently identified and, for each project, note the estimated date when construction would need to begin. In the absence of the Study completion and case studies to develop and test transition activities, it is anticipated that the necessary lead time to assess and implement a DSM alternative could be 4 - 6 years. This would include time for:

- feasibility analysis and program design for the targeted area,
- DSM program funding approval, program ramp up, and a minimum of 12 months of program implementation,
- program evaluation and results assessment, and
- Regulatory and engineering approval in the event that the DSM alternative was not successful in meeting the required reduction in peak demand.

One to three projects may be selected for participation in the Study. One or more other case studies may be selected to support data acquisition and analysis. Feasibility analysis for the DSM alternative in each area would be conducted using methods developed through the Study. For example, in a case study that targets a specific infrastructure project, Distribution Planning would provide the reduction in peak required in each case study area in order to defer the planned infrastructure investments for a set period of time. The study would include a review of DSM measures and programs to determine those

[2] EB-2014-0134 Report of the Board Demand Side Management Framework for Natural Gas Distributors (2015 – 2020) December 22, 2014, Page 36

with significant impact on peak. The resulting "peak eligible" measures would then be assessed for their potential technical impact on peak in the selected case study areas. Similarly, DSM programs would be reviewed in relation to their suitability for the specific case study areas and changes needed to achieve the necessary market penetration to meet the required reduction in peak.

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AVOIDED DISTRIBUTION COSTS

Prepared for:

Enbridge Gas Distribution

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EXECUTIVE SUMMARY

Navigant Consulting Ltd. (Navigant) has been retained by Enbridge Gas Distribution (Enbridge) to determine the downstream or distribution avoided costs. These costs are a potential addition to the currently approved avoided costs that are used for cost effective screening purposes in the Total Resource Cost test (TRC) as outlined in the DSM Guidelines for Natural Gas Utilities.

During the initial discovery stage of this assignment it was determined that Enbridge's upstream or transmission avoided costs are already fully and accurately captured in their existing avoided cost analysis. The objective was subsequently modified from a study of both transmission and distribution avoided costs to only include the determination of the distribution or downstream avoided costs. In addition, the distribution avoided cost determined in this study is to be used as an "adder" to the upstream avoided cost using the same metric and units ($\$/10^3\ m^3$ of DSM savings) such that the two values may be summed to provide a single avoided cost amount covering the upstream and downstream avoided costs. The purpose of this study is to provide a reasonable approximation for a distribution avoided cost in order to capture the full franchise-wide benefits when screening DSM programs. For clarity, this avoided cost from this study is not applicable for DSM programs that provide only peak hourly demand reductions and no annual volume reduction, or that are targeted for a specific location within the franchise area. This analysis is one of the subjects for the IRP Study to be undertaken following the Board's direction in the 2015 DSM Framework.

As part of identifying a suitable methodology, Navigant researched a number of jurisdictions outside of Ontario, as well as the distribution avoided cost approaches previously used by Enbridge. The outcome of this research is a methodology that combines the Enbridge method with an approach used by Puget Sound Energy. This methodology is based on the "time value of money" principle and determines the value of deferring a distribution system project driven by an increase in peak demand. The methodology assumes a DSM program is implemented which eliminates one year of peak day demand growth for the time period that the energy efficiency measures or actions implemented as a result of the DSM program are in place, or what is commonly referred to as the Effective Useful Life (EUL) of the program. The outcome is that the distribution project required to serve the increase in peak demand growth that would have occurred absent the DSM program would no longer be required, and is deferred for the EUL of the DSM program.

Enbridge investigated the impact of DSM on the four types of distribution mains (sales, reinforcement, replacement and relocation) in its 1996 DSM Plan. It was found that "*…the impact of DSM on sales, replacement and relocation mains is small, and would have only a marginal*

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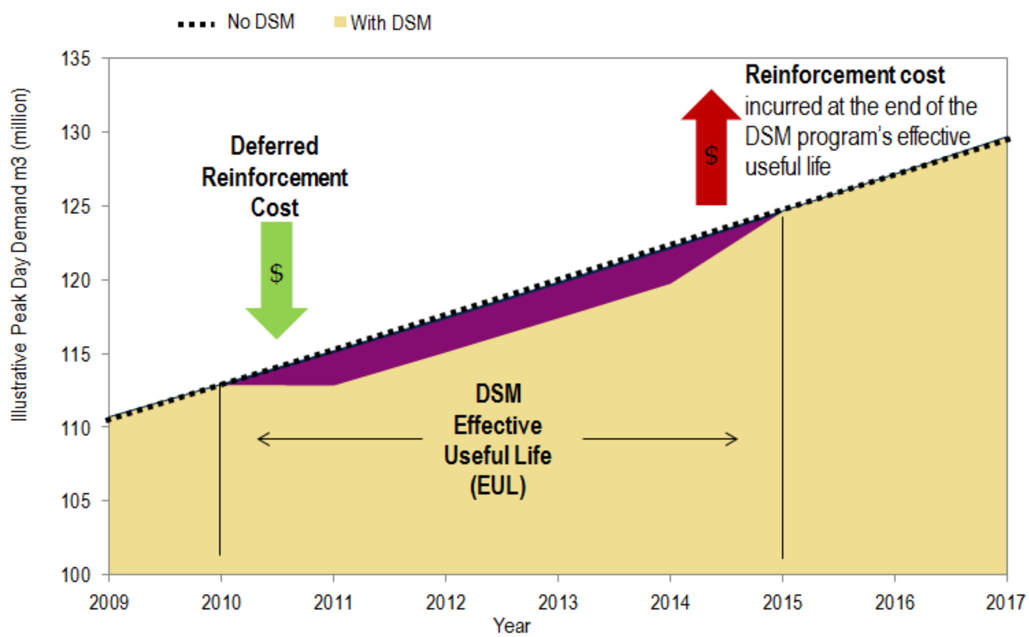
impact on the total avoided costs.[1]" Therefore, for the purpose of this study, only costs that can be directly attributed to reinforcement mains are examined to capture the load additions that can be avoided (or deferred) through DSM efforts.

The avoided cost methodology is illustrated in Figure 1.

Figure 1 – Illustrative Avoided Distribution Cost Calculation Methodology



The data inputs to the calculation include an estimate for one year's reinforcement cost and a projected increase in peak day demand. Annual average values for both the reinforcement cost and the peak day demand have been estimated based on historical and forecast values supplied by Enbridge. The EUL assumed for the analysis is 18 years which is the weighted average EUL for Enbridge's current portfolio of DSM programs. While demand has been stated in terms of peak day for the purpose of this analysis, it should be noted that for distribution system engineering and design, reinforcement project requirements are based on peak hourly demand. The TRC test is conducted from the point of view of all program participants and society and the ratepayer perspective is represented in the Ratepayer Impact test (RIM). In order for the avoided distribution cost analysis to also reflect the ratepayer perspective, the impact of deferring the reinforcement cost has been calculated in terms of the gas distribution rates customers pay, or revenue requirement. The avoided distribution cost is then calculated in each year by dividing the annual change in revenue requirement by the

[1] EBRO 490, D2-6-1 Pg. IV-34

annual reduction in peak day demand. The result is an annual avoided distribution cost per unit of peak day demand ($/10^{3}m^3 annual peak day demand) for each year of the DSM program's EUL.

The last step of this analysis is to present the calculated avoided cost in terms of annual DSM volumes saved instead of peak day demand gas savings. This is done by using Enbridge's existing DSM load shape profiles using the peak day demand to annual volume ratio. Enbridge uses four DSM load shapes: i) industrial processes; ii) space heating; iii) water heating; and iv) space and water heating. The ratio of peak day demand to annual volume for each of the four DSM load shapes is used to convert the peak day demand distribution avoided cost ($/10^{3}m^3 annual peak day demand) to a volumetric avoided cost. The result is a cost per annual volume of DSM savings metric ($/10^{3}m^3) for each of the four load shapes representing avoided distribution costs that can be multiplied by the annual volume of gas savings from a DSM program in a given year. The results are summarized in Table 1.

Table 1 – Avoided Distribution Costs by Load Shape ($/10^{3}m^3)

Year	Industrial Processing	Space Heating	Water Heating	Space and Water Heating
2015	$4.44	$15.51	$4.21	$14.26
2016	$3.73	$13.05	$3.55	$12.00
2017	$3.69	$12.90	$3.51	$11.86
2018	$3.64	$12.73	$3.46	$11.71
2019	$3.59	$12.55	$3.41	$11.54
2020	$3.53	$12.35	$3.36	$11.36
2021	$3.48	$12.15	$3.30	$11.17
2022	$3.41	$11.93	$3.24	$10.97
2023	$3.35	$11.70	$3.18	$10.76
2024	$3.28	$11.45	$3.11	$10.54
2025	$3.21	$11.20	$3.05	$10.30
2026	$3.13	$10.94	$2.97	$10.06
2027	$3.05	$10.67	$2.90	$9.82
2028	$2.97	$10.40	$2.83	$9.56
2029	$2.89	$10.11	$2.75	$9.30
2030	$2.81	$9.82	$2.67	$9.03

Year	Industrial Processing	Space Heating	Water Heating	Space and Water Heating
2031	$2.72	$9.52	$2.59	$8.76
2032	$2.64	$9.21	$2.50	$8.48

In addition to the annual avoided distribution cost values, the results have also been presented on a "levelized" basis with a single avoided distribution cost. This levelized value can be used as an alternative to the annual avoided costs for the EUL of the DSM program, and produces an equivalent result on a net present value basis. The results are provided in Table 2.

Table 2 – Avoided Distribution Costs by Load Shape (nominal $/103m3)

Load Shape	Avoided Distribution Costs
Industrial Processing	$3.45
Space Heating	$12.06
Water Heating	$3.28
Space and Water Heating	$11.09

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1 Introduction

Navigant Consulting Ltd. (Navigant) has been retained by Enbridge Gas Distribution (Enbridge) to determine distribution avoided costs. These costs are a potential addition to currently approved avoided costs that are used to in the Total Resource Cost (TRC) formula outlined in the DSM Guidelines for Natural Gas Utilities.

During the initial discovery stage of this assignment, it was concluded that Enbridge's existing avoided cost calculation methodology accurately captures all upstream avoided costs including transmission. The objective was subsequently modified from a study of both transmission and distribution avoided costs to only include the determination of the distribution or downstream avoided costs. Enbridge has calculated avoided transmission costs using a proprietary model (SENDOUT) since 1995, and plans to continue with this approach going forward.

1.1 Background and Objectives

1.1.1 Avoided Costs

An avoided cost is a metric used to quantify the benefits of DSM programs. It includes the costs associated with gas supply, transmission, and distribution that would no longer be incurred as a result of a decrease in annual and/or peak demand attributable to a DSM program.

For the purpose of this Report, transmission and distribution costs are defined as:

1. **Transmission costs:** is the supply cost for gas delivered to the "city gates" of the utility. Components include the commodity, pipeline transportation, storage, and peaking service costs. As defined, transmission costs are equivalent to "upstream" costs.
2. **Distribution costs:** also called "downstream" costs, includes costs associated with delivering gas from the city gates to the customer within Enbridge's franchise area or distribution system. Components include costs associated with reinforcement, sales, relocation, and replacement mains. For the purpose of this study, only costs that can be directly attributed to reinforcement mains driven by growth in peak demand are examined to capture the load additions that can be avoided through DSM efforts.

This terminology will be used throughout the report to describe the two components of avoided costs. Although the secondary research in Section 2 of this report discusses both avoided transmission and distribution costs, the focus of the analysis is on the approximation of avoided distribution costs only.

1.1.2 Objectives

The stated objective of this assignment is to determine a downstream or distribution avoided cost suitable for Enbridge to include in their current avoided gas costs. Note that the avoided costs developed through this study represent average avoided distribution costs suitable for use on a franchise-wide basis as opposed to location-specific avoided costs for a specific infrastructure reinforcement project.

It was also noted that the avoided distribution costs are to be calculated using the same metric and units as Enbridge's avoided gas costs such that the two values may be summed to provide a single avoided gas cost amount suitable for use in The Total Resource Cost effectiveness test.

1.2 Structure of Report

Section 1, Introduction provides background information and states the objective of this Report. Section 2 provides an overview of the methodologies and approaches used in other jurisdictions to estimate the avoided costs of both transmission and distribution for gas and electricity. This section also reviews the gas transmission and distribution avoided cost methodologies used by Enbridge in previous DSM Plan submissions.

Navigant's recommended methodology to estimate the avoided distribution costs is described in Section 3, and the results of the avoided distribution cost analysis are presented in Section 4. The detailed descriptions, data, assumptions, and calculations for each component of the analysis are included in the appendices.

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2 Secondary Research

2.1 Overview

This section examines the methodologies used in four jurisdictions to calculate avoided transmission and distribution costs in both gas and electric utilities. This section also examines the methodologies and approaches used by Enbridge to develop avoided transmission and distribution costs in past DSM plan filings with the Ontario Energy Board (OEB).

2.1.1 Avoided Transmission Costs

Avoided transmission costs are typically calculated using one of three approaches:

- marginal cost approach;
- decrement approach; or,
- a hybrid approach.

The marginal cost approach develops a per-unit metric to express the value of a specific transmission resource that is avoided as a result of DSM programs. This is the simplest approach and is often used due to its low data and modeling requirements.

The decrement approach develops load scenarios (e.g., peak day, winter season, etc.) and determines the value of transmission resources needed to satisfy each load scenario. The DSM programs are then valued based on the specific load scenario or combination of load scenarios, for an avoided load decrement. This approach is more complex and requires additional data and modeling capabilities.

A hybrid approach uses a combination of both approaches based on the data available and the level of sophistication desired.

2.1.2 Avoided Distribution Costs

Based on the jurisdictions researched, two approaches were identified to calculate avoided distribution costs.

- marginal cost approach; and
- avoided cost for distribution system capacity upgrades.

The marginal cost approach is based on the average difference in cost for gas delivered to the city gate, and the cost of gas delivered to the customer. The avoided cost for distribution system capacity upgrades is based on an estimate of the planned reinforcement costs through a planning horizon.

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2.2 Jurisdictional Research (Gas and Electric)

2.2.1 New England

Gas

New England calculates avoided gas costs using a marginal cost approach considering both the avoided cost of gas delivered to the utility (considering both commodity and transmission costs), and the avoided cost of delivering gas within the utility (distribution). The resulting avoided costs are volumetric with no capacity component.

To determine the value of the avoided transmission cost, New England develops representative load shapes for each retail customer by dividing annual gas requirements into six load segments that correspond to types of gas resources. Table 3 lists the six representative load segments.

Table 3 – New England: Representative Load Segments

Representative Load Segments
Annual base load (365 days per year)
Winter/shoulder load (280 days per year)
Winter base load (151 days per year)
90-day load
30-day load
10-day load

The utility develops a lowest-cost portfolio of supply resources and determines the marginal supply resource based on the characteristics of the supply portfolio. The analysis considers the opportunities the utility has to add or eliminate resources from the supply portfolio taking into account existing agreements. The utility matches the supply resource to each load segment. The highest priced resource is considered the marginal cost that can be avoided. Avoided costs are developed for each end use (E.g., residential heating) and region.

To determine the value of the avoided distribution cost, New England measures the difference between the city gate price of gas and the price charged to each retail customer type, also called the "retail margin." New England considers the "retail margin" as the change in the cost of distribution as demand for gas increases or decreases which depends on the customer segment and load type and expresses this metric as a percentage of embedded costs. In some regions, the "retail margin" is not considered avoidable.

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Electric

Other components are also calculated such as avoided electric energy costs ($/kWh) representing the reduction in the annual quantity of electric energy that load serving entities will need to purchase, and local transmission and distribution infrastructure costs that are avoided due to delays in the timing and/or any size reductions in new projects.

New England determines the value of avoided electric capacity ($/kW-year) using the revenues gained from and the value of generating capacity avoided by demand reductions no longer bid into the Forward Capacity Market.

2.2.2 California

Gas

California calculates avoided transmission and distribution gas costs using a marginal cost approach. The resulting avoided costs are volumetric with no capacity component. California calculates the transmission and distribution components together.

Avoided commodity costs are calculated for each utility, month, and year using the forecasted market price (commodity cost), cost of avoided compression gas (expressed as a market price), and losses.

$$\begin{aligned} &Commodity\ Cost\ \times (1\ + Avoided\ Compression\ Gas) \\ &\qquad \times Reduced\ Loss\ as\ a\ Percent\ of\ Market\ Price \end{aligned}$$

Avoided transmission and distribution costs are calculated using an estimate of the marginal transportation cost for delivering gas to the end user. This value is calculated for each utility, customer class, and year using the transmission and distribution marginal cost (average cost of delivering gas to each service class) and a monthly transmission and distribution allocation (assignment of the natural gas capacity cost to the winter season based on system throughput).

$$T\&D\ Marginal\ Cost\ \times Monthly\ T\&D\ Allocation$$

Electric

California determines the value of avoided electricity costs using costs from utility rate case filings used as proxy long-run marginal costs of a transmission and distribution investment. Transmission and distribution capacity costs are based on hourly temperature data, which consider local loads. The hottest hours are assumed to occur when the system is most constrained and will thus require upgrades.

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2.2.3 Colorado

Gas

Colorado calculates avoided gas costs using a marginal cost approach. The avoided costs are calculated on a volumetric basis only with no capacity based rate.

Three components are considered in the calculation of avoided gas costs: avoided commodity costs, avoided capacity costs, and avoided variable O&M costs.

- Avoided commodity costs are developed using price forecasts.
- Avoided capacity costs represent the cost of service to transport incremental gas supplies to the metropolitan Denver area. The avoided capacity cost is assumed to be equal to Colorado Interstate Gas (CIG) firm transportation rate.
- Avoided variable O&M costs used are provided by the Public Service Company of Colorado public pricing and planning group.

Electric

Colorado determines the value of avoided electricity costs assuming a proxy resource on the margin. Avoided generation capacity costs are calculated using generic capacity cost estimates for a gas-fired combustion turbine and gas-fired combined-cycle plant. Avoided transmission and distribution capacity costs, which are developed by the Public Service Company of Colorado resource planning group, are calculated using an assumed flat rate which is escalated annually. Avoided marginal energy costs are calculated using costs for a gas-fired combustion turbine and gas-fired combined-cycle plant.

2.2.4 Puget Sound Energy

Gas

Puget Sound Energy calculates avoided gas costs using a marginal cost approach. The resulting avoided costs include both a volumetric and capacity component.

Avoided gas costs include five components: weighted average cost of gas (commodity cost), avoided pipeline demand charge (transmission cost), avoided pipeline transportation charge (transmission cost), pipeline fuel reimbursement (transmission cost), and avoided distribution capacity upgrades (distribution cost).

- The weighted average cost of gas is developed by end use and represents the weighted average commodity cost based on the timing of savings for six representative end uses.
- Avoided pipeline demand charge is calculated on the basis of the savings that occur on a peak day and is considered for each dekatherm of additional daily capacity that is avoided.

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- Avoided pipeline variable transportation charge is calculated using the O&M on the pipeline.
- Pipeline fuel reimbursement is represented in the calculation as an adder calculated using the additional savings on the fuel used for compression.
- Avoided distribution capacity upgrades are calculated using the estimated cost of pipeline reinforcements through the planning period and are assumed to represent one time costs that can be deferred. These costs are modelled as an avoided payment or the yearly value of the levelized cost calculated over a time period provided by the Puget Sound Energy planning group.

2.3 Past Enbridge Avoided Gas Cost Efforts

2.3.1 Avoided Gas Cost Study, 1994

Enbridge (then Consumers Gas) retained Hampton Strategies, Inc. (Hampton) to provide an independent review and critique of its approach to determining avoided gas costs. The report was completed in 1994. The report recommended an increment/decrement methodology.

The methodology is built upon some key concepts that were recommended by Hampton to develop the avoided gas costs:

- Avoided Gas Costs (AGC) methodologies should be based upon the planning and operation of the local distribution company's (LDC's) system and the cost of decisions at the margin
- AGCs should be calculated by evaluating the change in costs that result from a change in the peak demand and the change in the volume of gas consumed
- Planners should consider: duration of load and opportunities to manage gas supplies between seasons, thus different supply mixes will meet different load shapes
- LDCs plan to meet the entire annual load duration curve, not the load at any single point along the supply curve, therefore unit AGCs at any point along the supply curve may vary between customers
- The gas system is dispatched to accommodate the total expected load on a given day, therefore unit short run marginal costs (SRMC) at any point along the load duration curve are the same for all customers
- AGC methodologies should be forward looking

The recommended methodology is built upon the utility planning process and essentially determines the costs associated with varying supply scenarios. The avoided costs become the difference between various scenarios and a "base case." Alternative supply plans are calculated for different load shapes that have varying effects on gas supply costs. Table 4 specifies each load shape scenario recommended in the Hampton methodology.

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Table 4 – Hampton Strategies Methodology: Load Shape Scenarios

Load Shape Scenarios
Peak load reduction
Winter heating load reduction
Water heating load reduction
Off-peak load reduction
Annual constant load reduction
Residential cooling load increase
Commercial cooling load increase

The recommended methodology can be broken down into four steps:

1. Develop base case supply scenario to serve the requirements of a base case demand forecast.
2. Add or remove gas supply requirements and modify supply mix to meet the seven alternative demand scenarios.
3. The difference in total fixed and variable charges between the base supply scenario and each alternative supply plan is divided by the annual difference in demand requirements for the corresponding case to arrive at the AGC for that particular load shape.
4. The gas cost savings relate to the annual change in load.

2.3.2 Past Enbridge DSM Filings

Enbridge filed the 1995 DSM Plan using a decrement/increment methodology to calculate avoided gas costs using proxy resources where necessary. The three decrement scenarios included in the analysis were: peak day, winter season, and summer season. The avoided gas costs calculated represent the avoided gas costs for the service territory as a whole and do not include the avoided costs to deliver gas from the city gates to the customer (avoided distribution costs). Enbridge uses a proprietary model to develop the transmission or upstream avoided gas costs.

Enbridge also calculated avoided distribution or downstream costs for reinforcement mains. It was determined that the other distribution costs such as sales, relocation, and replacement mains were either immaterially affected by DSM programs or not impacted by customer additions. As an example, replacement and relocation mains are typically driven by events such as conflicts with other infrastructure developments or maintenance, and are not related to load growth. Avoided costs for reinforcement mains were calculated using the historical relationship between annual expenditures in reinforcements and load growth.

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Table 5 outlines the methodologies used in Enbridge's DSM filings from 1995 to 1999.

Table 5 –Avoided Cost Methodologies in Past DSM Filings

Proceeding	DSM Plan	Notes
EBRO 487	1995 DSM Plan	**Avoided Gas Costs** The calculation used a "decrement approach" which compares long-term system supply costs under a "business-as-usual" scenario and three "decrement" scenarios: Peak Day, Winter Season, and Summer Season. The calculation included commodity, transportation, and storage.
		Avoided Distribution System Costs Focused only on reinforcement mains costs as being the primary category of distribution system costs affected by load reduction. The estimate was based on the ratio between historic annual expenditures on reinforcement mains and annual increases in demand over two 10 year periods.
EBRO 490	1996 Plan	**Avoided Gas Costs** Avoided gas costs were based on commodity, transportation, and storage. The long term demand forecast was updated. The decrement method was used to calculate the avoided gas costs and the load shapes were changed to Water Heating, Space Heating and Industrial Process from the seasonal load shapes used in 1995 DSM Plan.
		Avoided Distribution System Costs EBRO 492 indicates that avoided distribution costs were included in EBRO 490.
EBRO 492	1997 Plan	**Avoided Gas Costs** Used same methodology as in EBRO 490.
		Avoided Distribution System Costs Updated to reflect change to deferral of reinforcement rather than outright avoidance. "A more detailed analysis of the extra high pressure systems, assuming system-wide growth in demand and DSM savings, indicated that the average reinforcement would be postponed, but not avoided." The updated avoided distribution system costs represent the carrying cost savings resulting from deferring the investment in reinforcement for two years.
EBRO 495	1998 Plan	**Avoided Gas Costs** Used the same methodology as in EBRO 492 with one exception. The scaling factor decrement of 2.5 percent recommended by Hampton Strategies was reduced to 1.0 to provide a more accurate forecast of avoided gas costs using the SENDOUT model. Hampton Strategies agreed with the change.
		Avoided Distribution System Costs Using the same method as in EBRO 492

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Proceeding	DSM Plan	Notes
EBRO 497. Ex D2, Tab 6, Sch 1, Page V60V18	1999 Plan	**Avoided Gas Costs** Used same methodology as in EBRO 495 with updated avoided costs based on market changes. **Avoided Distribution System Costs** Used same methodology as for EBRO 492

From 1999 to the present, EGD has updated avoided gas costs annually, using the same methodology in prior years, and filed the results with the Board as part of a DSM proceeding.

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3 Methodology

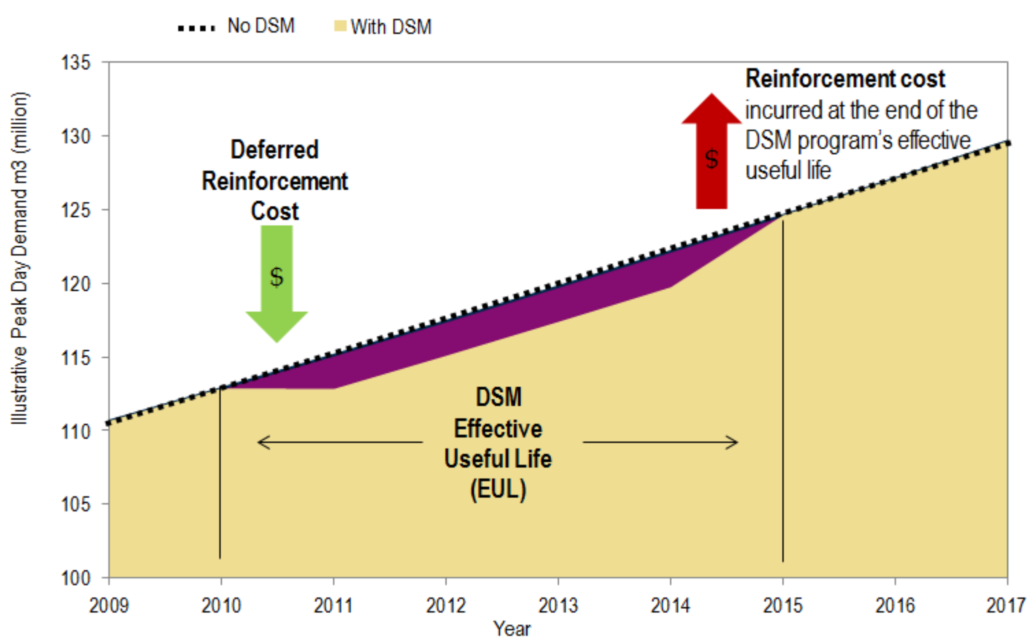
3.1 Overview

Navigant recommends a variation of the avoided distribution system capacity upgrade methodology to estimate the avoided "downstream" or distribution costs which is an adaptation of both Enbridge's past methodologies and the Puget Sound approach. The proposed methodology is also a function of the data available from Enbridge.

At a high level, the methodology is based on estimating the value of deferring the need for an increase in the distribution system peak demand capacity or expenditure to reinforce the distribution system as a result of a DSM program. The value is measured by calculating the "time value of money" for the time period over which the reinforcement expenditure is deferred.

Conceptually, the methodology assumes a DSM program is implemented which eliminates one year of peak demand growth for the time period that the energy efficiency measures or actions implemented as a result of the DSM program are in place, or what is commonly referred to as the Effective Useful Life (EUL) of the program. The outcome is that the distribution reinforcement required to serve the increase in peak demand growth that would have occurred absent the DSM program would no longer be required, and is deferred for the EUL of the DSM program. Figure 2 illustrates Navigant's recommended methodology.

Figure 2 – Illustrative Avoided Distribution Cost Calculation Methodology



The TRC test is conducted from the point of view of all program participants and society and the ratepayer perspective is represented in the Ratepayer Impact test (RIM). In order for the avoided distribution cost analysis to also reflect the ratepayer perspective, the impact of deferring the reinforcement cost has been calculated in terms of the annual change in revenue requirement. The avoided distribution cost is then calculated in each year by dividing the annual change in revenue requirement by the annual reduction in peak day demand. The result is an annual avoided distribution cost per unit of peak day demand ($\$/10^3m^3$ annual peak day demand) for each year of the DSM program's EUL. While demand has been stated in terms of peak day for the purpose of this analysis, it should be noted that for distribution system engineering and design, reinforcement project requirements are based on peak hourly demand. The peak hourly demand is assumed to be equal to one twentieth ($1/20^{th}$) of the peak day demand.

A detailed description of this avoided cost methodology is provided in Section 3.4.

3.2 *Distribution System Costs*

As discussed previously, components of distribution system costs include reinforcement, sales, relocation, and replacement mains.

- Reinforcement mains are driven by increases in annual peak demand (i.e., the highest volume of gas required in one hour of a given year) for existing gas lines.
- Sales mains are primarily small diameter mains and driven by the number of customer additions.
- Relocation and replacement mains are driven by routine maintenance and conflicts with other developments.

Enbridge investigated the impact of DSM on sales, replacement and relocation mains in its 1996 DSM Plan. It was found that "*…the impact of DSM on sales, replacement and relocation mains is small, and would have only a marginal impact on the total avoided costs.*[2]" Therefore, for the purpose of this study, only costs that can be directly attributed to reinforcement mains are examined to capture the load additions that can be avoided (or deferred) through DSM efforts.

Enbridge provided Navigant with both actual and forecast reinforcement expenditures. Figure 3 below, displays actual reinforcement expenditures from 2010 and 2013 and forecast reinforcement expenditures from 2014 to 2019. Reinforcement costs for larger projects are adjusted to reflect the proportion of the project costs that are directly attributable to load growth.

[2] EBRO 490, D2-6-1 Pg. IV-34

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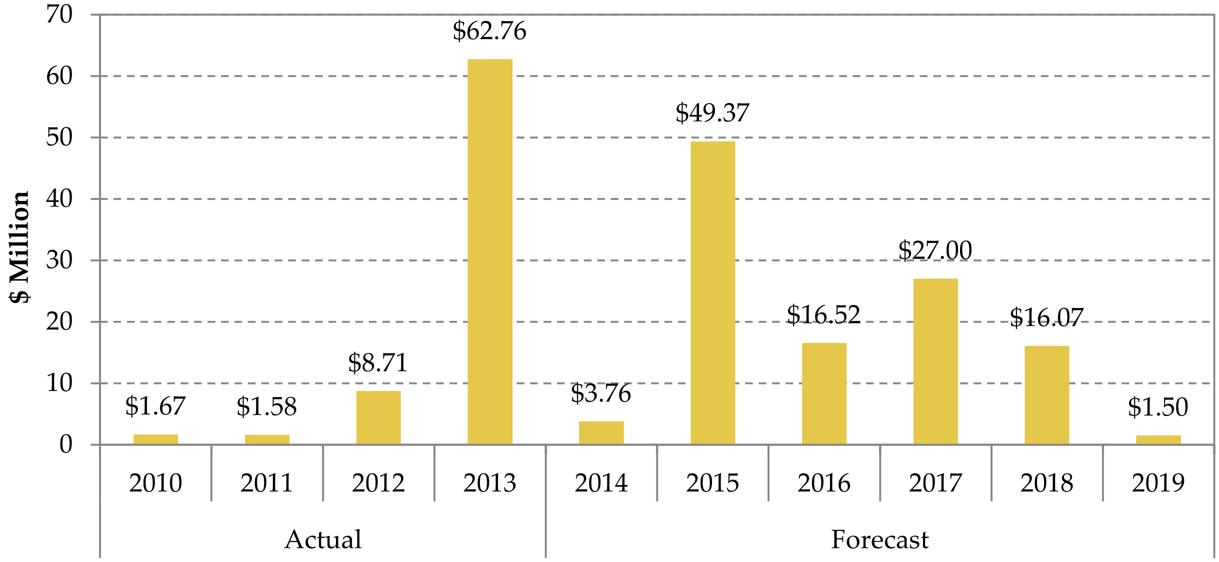
Figure 3 – Actual and Forecast Reinforcement Costs ($ million)



As can be seen in Figure 3, capital investments on reinforcement projects can change dramatically from one year to the next, and investments made in any one or two years would not be a reliable predictor of the following years' reinforcement costs. Similarly, peak day demand can vary from one year to the next due to many factors such as economic performance. While reinforcement costs are directly attributable to growth in peak demand over time, for example over ten year period, this relationship is not particularly evident when viewed over a short-term period. Larger reinforcement projects will also occur when viewing the data over the long term, for example, the figure above contains two larger capital reinforcement projects in 2013 and 2015.

An average of the actual and forecast reinforcement costs has been used to smooth out the yearly variations and to provide a perspective that includes both recent historical values as well as the latest forecast.

Navigant calculated an average annual reinforcement expenditure of $19.0 million (2015 real dollars) using both actual and forecast reinforcement costs from 2010 to 2019.

3.3 Peak Day Demand

Enbridge provided gross peak day demand data from 2010 to 2013 and forecast gross peak day demand from 2014 to 2019. Figure 4 below displays the normalized actual gross peak day demand from 2010 to 2013 and forecast gross peak day demand from 2014 to 2019.

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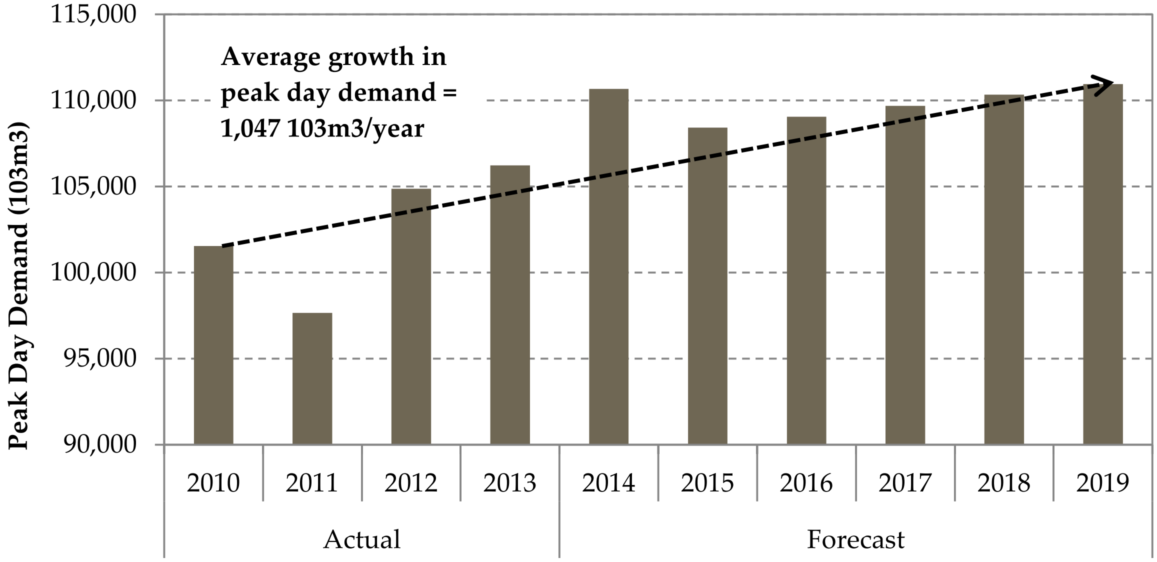
Figure 4 – Actual and Forecast Peak Day Demand (103m3)



Peak day demand is normalized to design conditions. Gross peak day demand is used in Navigant's analysis and reflects the annual maximum daily demand for the Enbridge system including unbundled customers. Unbundled customers purchase gas from a marketer and Enbridge is not responsible for upstream delivery, however, Enbridge is responsible for unbundled customers on its distribution system. In addition, Enbridge DSM programs are available to all distribution customers. Therefore, for the purposes of Navigant's analysis of avoided distribution costs, gross peak day demand is the appropriate perspective.

The peak day demand year over year varies significantly and at times decreases relative to the prior year. To develop an average annual peak demand day increase, Navigant calculated the peak demand day growth over the entire period and distributed the growth evenly into each year.

Using both actual and forecast peak day demand data from 2010 to 2019, Navigant calculated the average annual peak demand day increase of 39,653 GJ or 1,047 10^3m^3.

3.4 Distribution Avoided Cost Calculation

In order to calculate the impact of the reinforcement cost deferral, Navigant calculated the annual revenue requirement using two scenarios: 1) "no DSM" where the reinforcement cost is incurred in 2015, and 2) "with DSM" where the reinforcement cost is incurred 18 years later at the end of the EUL of the DSM program. The value of the distribution avoided cost is created by the timing difference of the annual revenue requirements for the two scenarios.

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The distribution avoided cost is calculated by dividing the change in revenue requirement from the average annual reinforcement cost (as detailed in section 3.4) by the average annual peak day demand growth of 1,047 10^3m^3 (as detailed in Section 3.3). The result is an avoided cost per unit of peak day demand ($/$10^3m^3$) over the 18 year EUL of the DSM program.

3.4.1 Detailed Methodology

Figure 5, below, illustrates annual peak day demand growth in absence of any new DSM programs. The Y-axis captures the annual increase in peak day demand and the X-axis captures time. Each year, average annual reinforcement costs are incurred to service the average annual growth in the peak day demand.

Figure 5 – Illustrative Peak Demand Day Load Growth

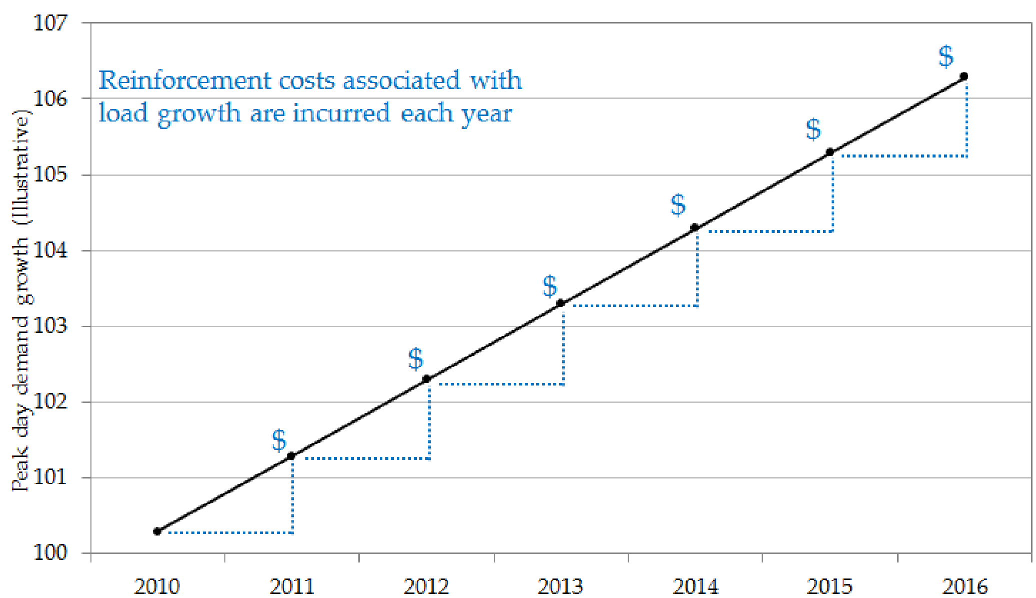

Figure 6, below, illustrates peak day demand growth following the implementation of a DSM program. Assume a DSM program is implemented in 2015 and flattens annual peak day demand growth from 2014 to 2015. In this scenario, there is no growth to trigger the need for reinforcement costs in 2015. The DSM program is only implemented in one year (2015), so peak day demand continues to grow year over year and reinforcement costs are incurred annually in the future. To summarize, due to the DSM program the annual peak day demand is lower in each year, but continues to grow at the same pace.

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Figure 6 – Illustrative Peak Demand Day Load Growth with DSM Program

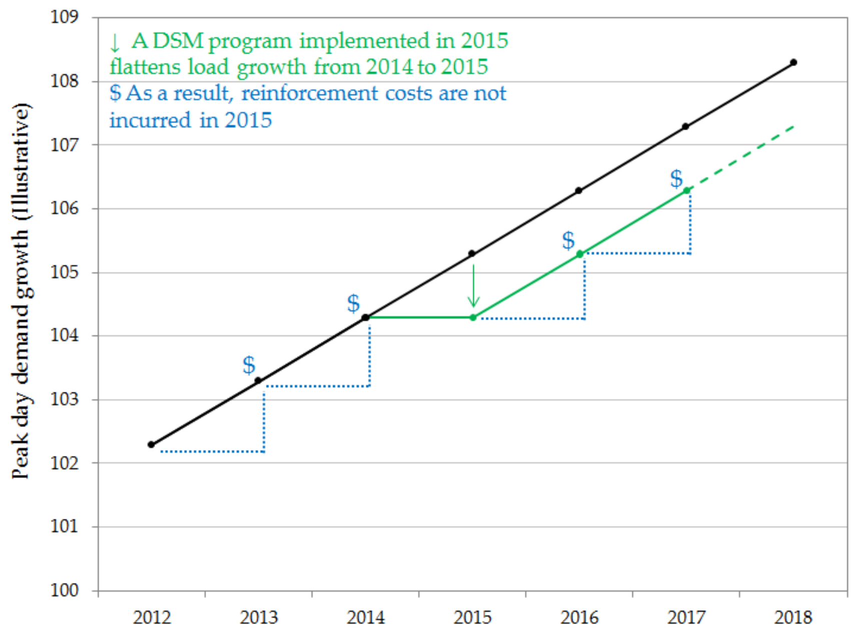
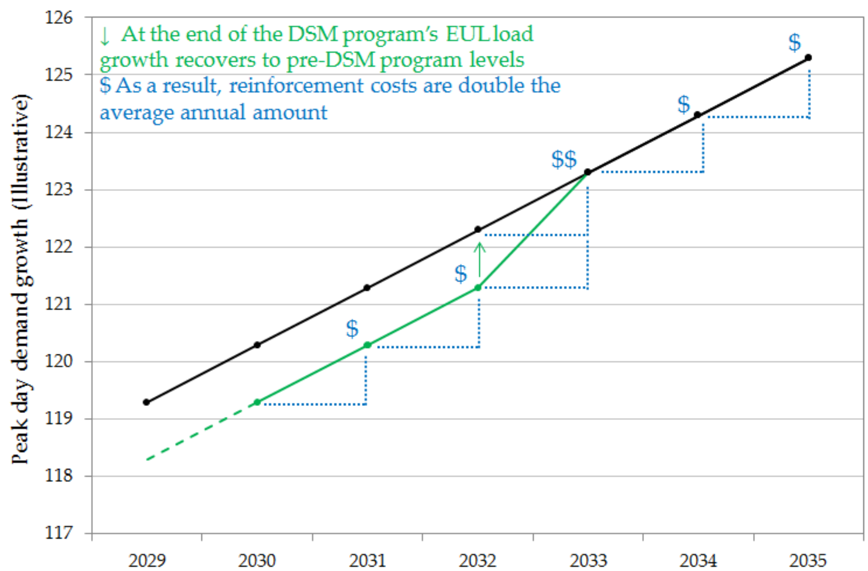


Figure 7, below, illustrates peak day demand growth once the DSM program reaches the end of its effective useful life (EUL). In this example and throughout the study it is assumed that the average EUL of a DSM program is 18 years, which is the average EUL of Enbridge's portfolio of DSM programs. Once the DSM program reaches the end of its EUL, peak day demand returns to the levels observed prior to the implementation of the DSM program. The peak day demand growth is double the annual average reflecting the normal annual growth plus the peak day demand growth returning to pre-DSM levels. Recall that reinforcement costs are triggered by the growth in peak day demand observed annually. Since growth is double, the reinforcement costs are also double.

Figure 7 – Illustrative Peak Demand Day Load Growth at EUL DSM Program



The reinforcement costs that would have been incurred in 2015, that are instead incurred at the end of the DSM program's EUL are considered the deferred reinforcement cost. Even though reinforcement costs are expected to be higher due to inflation, deferring the reinforcement costs generates a present value benefit due to the time value of money[3].

The benefit associated with the deferred reinforcement cost is shown by the difference between the "No DSM" (i.e., the black line) and the "With DSM" (i.e., the green line) scenarios. The value is determined by calculating the annual revenue requirement to recover the costs associated with the reinforcement using Enbridge-specific assumptions.

Figure 8, below, illustrates the annual revenue requirement associated with the two scenarios. The difference between the "With DSM" and "No DSM" scenarios represents the value of the deferred reinforcement costs and is illustrated by the black line.

[3] In theory, the value is realized from the returns that can be earned on the foregone investment each year the costs are deferred.

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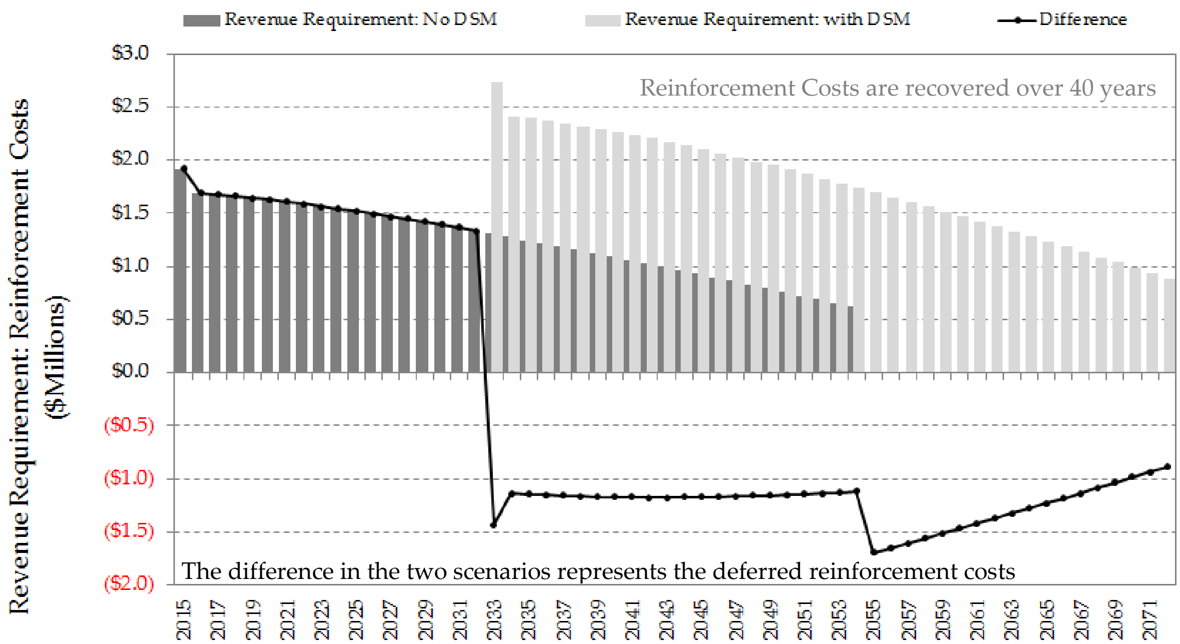
Figure 8 – Difference in Revenue Requirement with and without DSM Program



Recall that as a result of the DSM program, the annual peak day demand is lower in each year over the DSM program's EUL. The peak day demand savings allow the avoided reinforcement costs to be expressed as a per unit metric. Figure 9 below, illustrates the two components of the avoided distribution cost calculation:

- peak demand day savings over the EUL of the assumed DSM program, and;
- revenue requirement difference between the "With DSM" and "No DSM" scenarios

When examining the two components, it becomes clear that the timeframe of the values is not equivalent. The revenue requirement difference between the "With DSM" and "No DSM" scenarios is valued from 2015 to 2071 and the peak demand day savings are included from 2015 to 2032.

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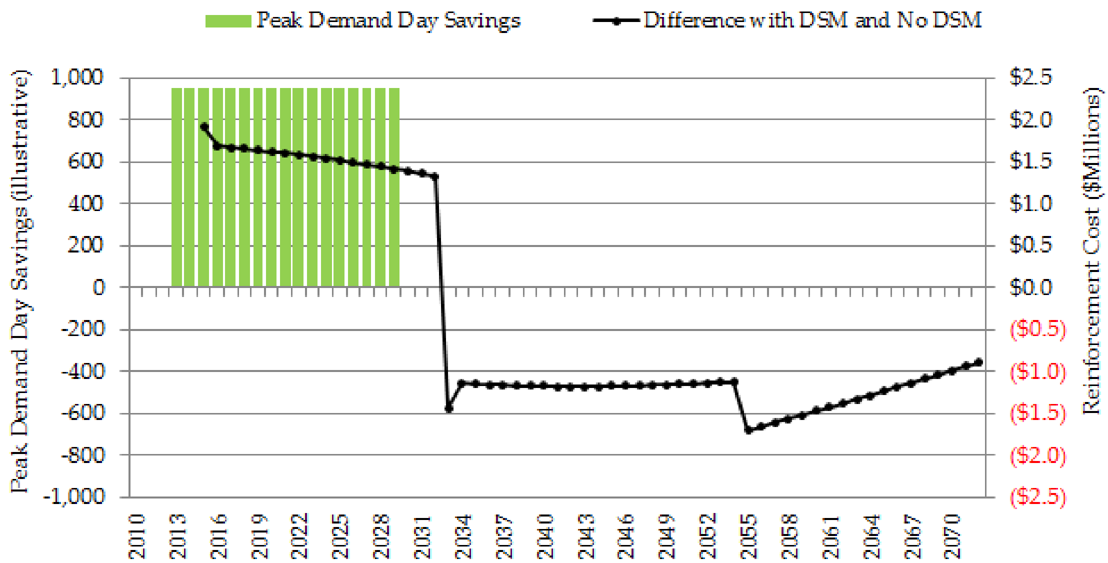
Figure 9 – Components of Avoided Reinforcement Cost Calculation



To develop a $/10³m3 metric for each year of the DSM programs EUL, both the avoided reinforcement costs and the peak day demand savings must be expressed for an equivalent time period. In order to correct for this difference, the annual revenue requirements for the years beyond the EUL of the DSM program (i.e. 2033 to 2071) have been present valued and then amortized over the 18 year EUL (i.e. 2015 to 2032). It should be noted that on a present value basis the two cash flows are equivalent.

3.5 DSM Load Shapes

As discussed previously, the avoided distribution costs must be expressed on a volumetric basis ($/10³m3) to allow the avoided distribution costs to be added to the avoided transmission costs and multiplied by the annual gas DSM savings (10³m3). To complete this conversion, load profiles are required to determine the ratio of peak day demand volume to annual volume. The avoided transmission costs are calculated for four "load shapes. The avoided distribution costs are calculated using the same four load shapes, allowing the two metrics (avoided transmission and avoided distribution costs) to be additive.

- Space heating;
- Water heating;
- Space and water heating; and,
- Industrial load.

Daily gas consumption for each load shape is gathered. The total annual consumption for the year is calculated and the gas consumption for the peak day demand (January 15) is determined. The consumption for the peak day demand is divided by the total annual

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consumption. The ratio for each of the four DSM load shapes is used to convert the peak day demand distribution avoided cost ($/$10^3m^3$ annual peak day demand) to a volumetric avoided cost. The result is a cost per annual volume metric ($/$10^3m^3$) for each of the four load shapes representing avoided distribution costs that can be multiplied by the annual volume of gas savings from a DSM program in a given year.

In addition to the annual avoided distribution cost values, the avoided distribution costs have also been calculated on a "levelized" basis with a single avoided distribution cost. This levelized value can be used as an alternative to the annual avoided costs for the EUL of the DSM program, and produces an equivalent result on a net present value basis.

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4 RESULTS

4.1 Summary of Results

The avoided distribution costs in terms of $\$/10^3m^3$ for each of the four load shapes are summarized in Table 6, below.

Table 6 – Avoided Distribution Costs ($\$/10^3m^3$)

Year	Industrial Processing	Space Heating	Water Heating	Space and Water Heating
2015	$4.44	$15.51	$4.21	$14.26
2016	$3.73	$13.05	$3.55	$12.00
2017	$3.69	$12.90	$3.51	$11.86
2018	$3.64	$12.73	$3.46	$11.71
2019	$3.59	$12.55	$3.41	$11.54
2020	$3.53	$12.35	$3.36	$11.36
2021	$3.48	$12.15	$3.30	$11.17
2022	$3.41	$11.93	$3.24	$10.97
2023	$3.35	$11.70	$3.18	$10.76
2024	$3.28	$11.45	$3.11	$10.54
2025	$3.21	$11.20	$3.05	$10.30
2026	$3.13	$10.94	$2.97	$10.06
2027	$3.05	$10.67	$2.90	$9.82
2028	$2.97	$10.40	$2.83	$9.56
2029	$2.89	$10.11	$2.75	$9.30
2030	$2.81	$9.82	$2.67	$9.03
2031	$2.72	$9.52	$2.59	$8.76
2032	$2.64	$9.21	$2.50	$8.48

In addition to the annual avoided distribution cost values, the results have also been calculated on a "levelized" basis with a single avoided distribution cost per unit of peak day demand ($/103m3). These levelized values, shown in Table 7, can be used as an alternative to the annual avoided costs for the EUL of the DSM program, and produces an equivalent result on a net present value basis.

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Table 7 – Annual Avoided Distribution Costs (nominal $/10^{3}m^3)

Decrement Scenario	$/10^{3}m^3/peak demand day
Industrial Processing	$3.45
Space Heating	$12.06
Water Heating	$3.28
Space and Water Heating	$11.09

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Appendix A: Enbridge Revenue Requirement Assumptions

To calculate the value of the deferred reinforcement costs, the cost of the average annual reinforcement project was calculated in terms of an annual revenue requirement over the asset life. The following Enbridge-specific assumptions were used in the calculation.

Table 8 - Enbridge-Specific Revenue Requirement Assumptions

Metric	Assumption
Tax Rate	26.5%
CCA Depreciation Rate	6%
O&M (%)*	0%
Asset Life	40 years
Weighted Cost of Capital (before tax)	6.8%
Reinforcement Cost Deferral Period (EUL)	18 years

* The O&M percentage used is derived based on an investigation of various costs for reinforcement mains and the following was identified:

1. In Line Inspection (i.e. inspection of the internal walls of the pipe) – this would apply to major reinforcement mains, but not all projects, and would be required every 7 years. The cost is relatively minor compared to the capital invested, and on a PV basis is not considered significant.
2. Leak Survey – leak survey conducted by vehicle or having an inspector walk the pipeline route, the cost is not considered significant
3. Cathodic Protection – would use a small electric load over a year, the cost would not be material.

The annual impact on revenue requirement is calculated using a financial model which reflects the incremental cash flows associated with the reinforcement project. This includes the capital investment and return on rate base, depreciation expense, debt service and taxes payable.

Figure 10 summarizes the revenue requirement and avoided distribution cost calculations.

Figure 10 – Avoided Distribution Cost Calculation

Year		2015	2016	2017	2018	2019	2020	2021	2022	2023 ...
Revenue Requirement: No DSM		$1,916,376	$1,689,548	$1,675,555	$1,660,155	$1,643,433	$1,625,467	$1,606,332	$1,586,099	$1,564,833 ...
Revenue Requirement: with DSM		$0	$0	$0	$0	$0	$0	$0	$0	$0 ...
Difference (No DSM - with DSM)		$1,916,376	$1,689,548	$1,675,555	$1,660,155	$1,643,433	$1,625,467	$1,606,332	$1,586,099	$1,564,833 ...
Peak Demand Day Growth (103m3)		1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047 ...
$/103m3		$1,831.21	$1,614.46	$1,601.09	$1,586.37	$1,570.39	$1,553.23	$1,534.94	$1,515.61	$1,495.29 ...
A: $/103m3 over the 40 year revenue requirement of both scenarios (2015 to 2072)										
$/103m3 By Decrement Scenario:										
Industrial Processing	0.32%	$5.95	$5.24	$5.20	$5.15	$5.10	$5.04	$4.98	$4.92	$4.86 ...
Space Heating	1.13%	$20.78	$18.32	$18.17	$18.00	$17.82	$17.63	$17.42	$17.20	$16.97 ...
Water Heating	0.31%	$5.65	$4.98	$4.94	$4.89	$4.84	$4.79	$4.73	$4.67	$4.61 ...
Space and Water Heating	1.04%	$19.11	$16.85	$16.71	$16.56	$16.39	$16.21	$16.02	$15.82	$15.61 ...
B: $/103m3 condensed into 18 year EUL of DSM program										
$/103m3 By Decrement Scenario:										
Industrial Processing	0.32%	$4.44	$3.73	$3.69	$3.64	$3.59	$3.53	$3.48	$3.41	$3.35 ...
Space Heating	1.13%	$15.51	$13.05	$12.90	$12.73	$12.55	$12.35	$12.15	$11.93	$11.70 ...
Water Heating	0.31%	$4.21	$3.55	$3.51	$3.46	$3.41	$3.36	$3.30	$3.24	$3.18 ...
Space and Water Heating	1.04%	$14.26	$12.00	$11.86	$11.71	$11.54	$11.36	$11.17	$10.97	$10.76 ...

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APPENDIX B: DSM LOAD SHAPES

To express the results on a volumetric basis, four DSM load shapes capture the percent of total load coincident with the peak demand day. Figure 11 to Figure 14 below, illustrate the load shapes, and the ratio of peak day demand to annual volume is summarized in Table 9.

Figure 11 – Residential Space Heating DSM Load Shape

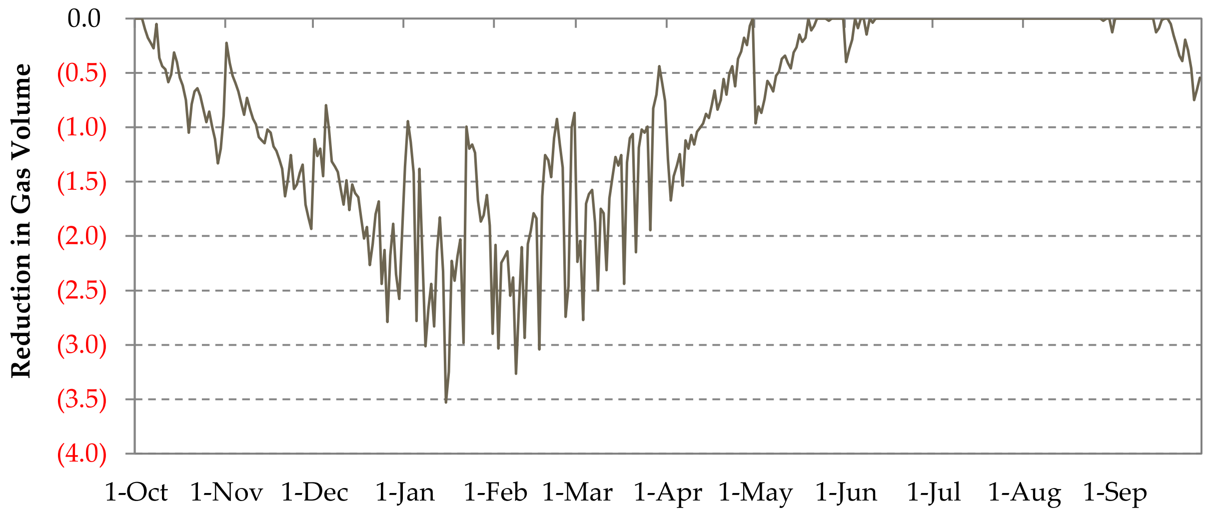

Figure 12 – Residential Water Heating DSM Load Shape

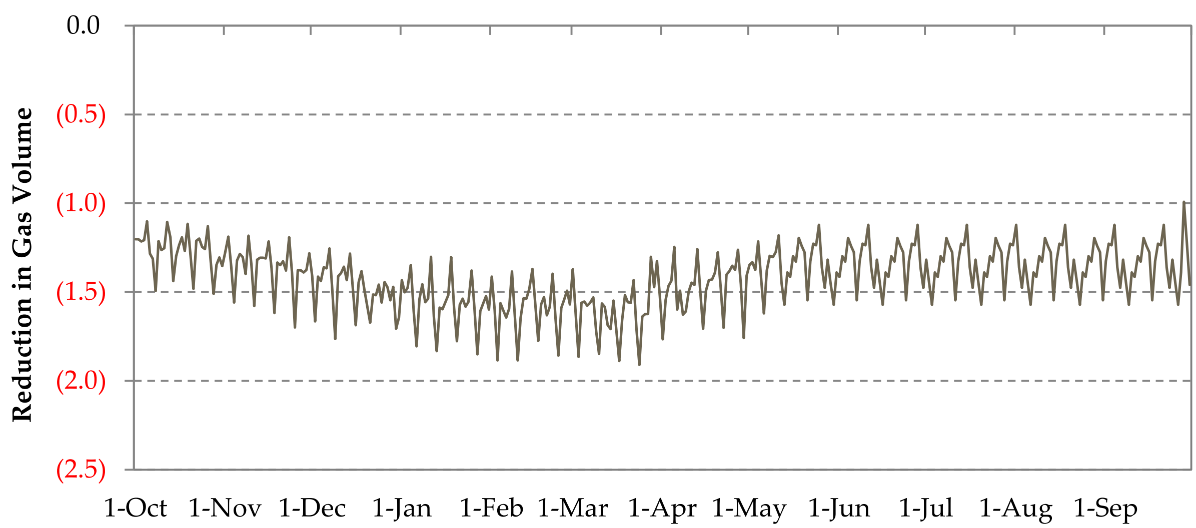

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Figure 13 – Space and Water Heating DSM Load Shape

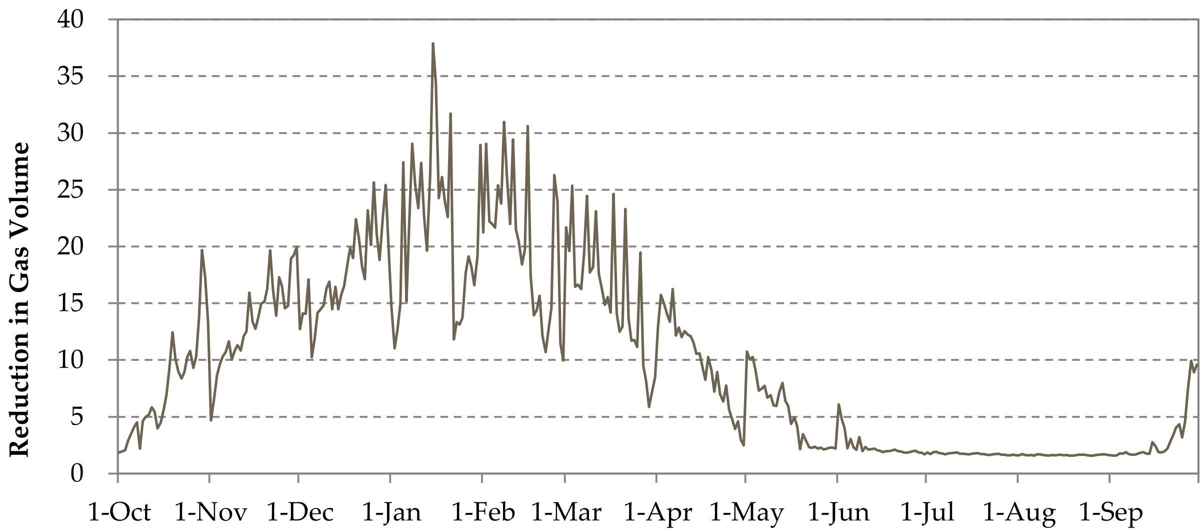
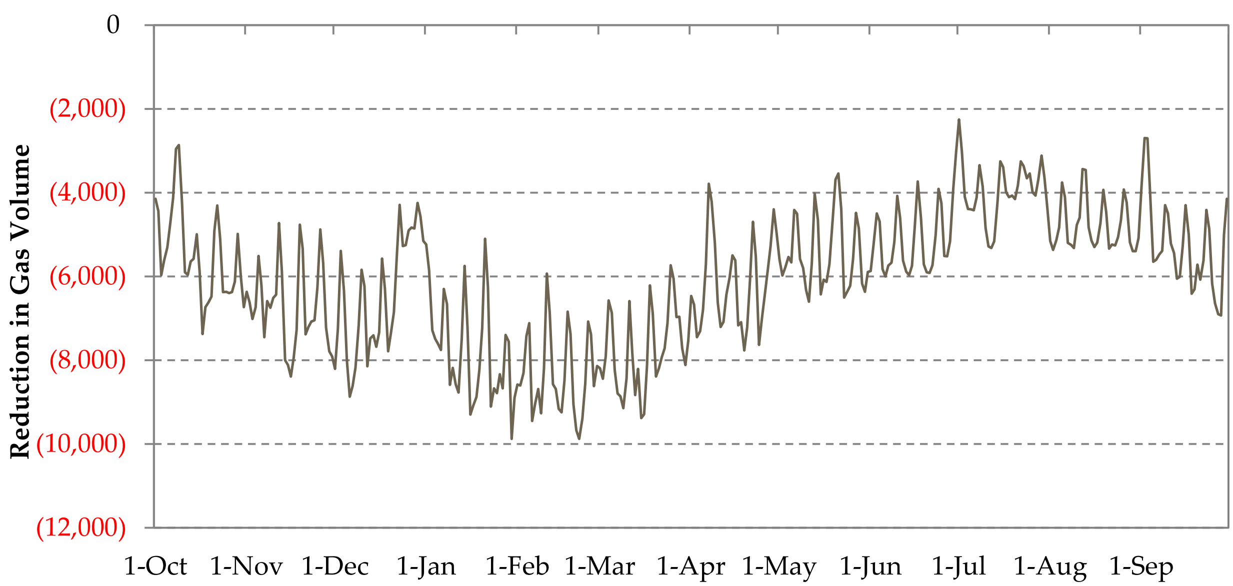


Figure 14 - Industrial Processes DSM Load Shape



To calculate the ratios used to convert the deferred reinforcement cost to a volumetric rate, the daily load shapes were examined. The total load for a one year period was calculated and the load on the peak demand day was isolated and compared to the total load. This calculation results in the peak day load as a percentage of annual volume for each load shape. The calculated ratios for each of the four load shapes are shown in Table 9 below.

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Table 9 - Ratios for each Load Shape

Load Shape	Ratio of Peak Day Demand to Annual Volume
Space Heating	1.13%
Water Heating	0.31%
Space and Water Heating	1.04%
Industrial Load	0.32%

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